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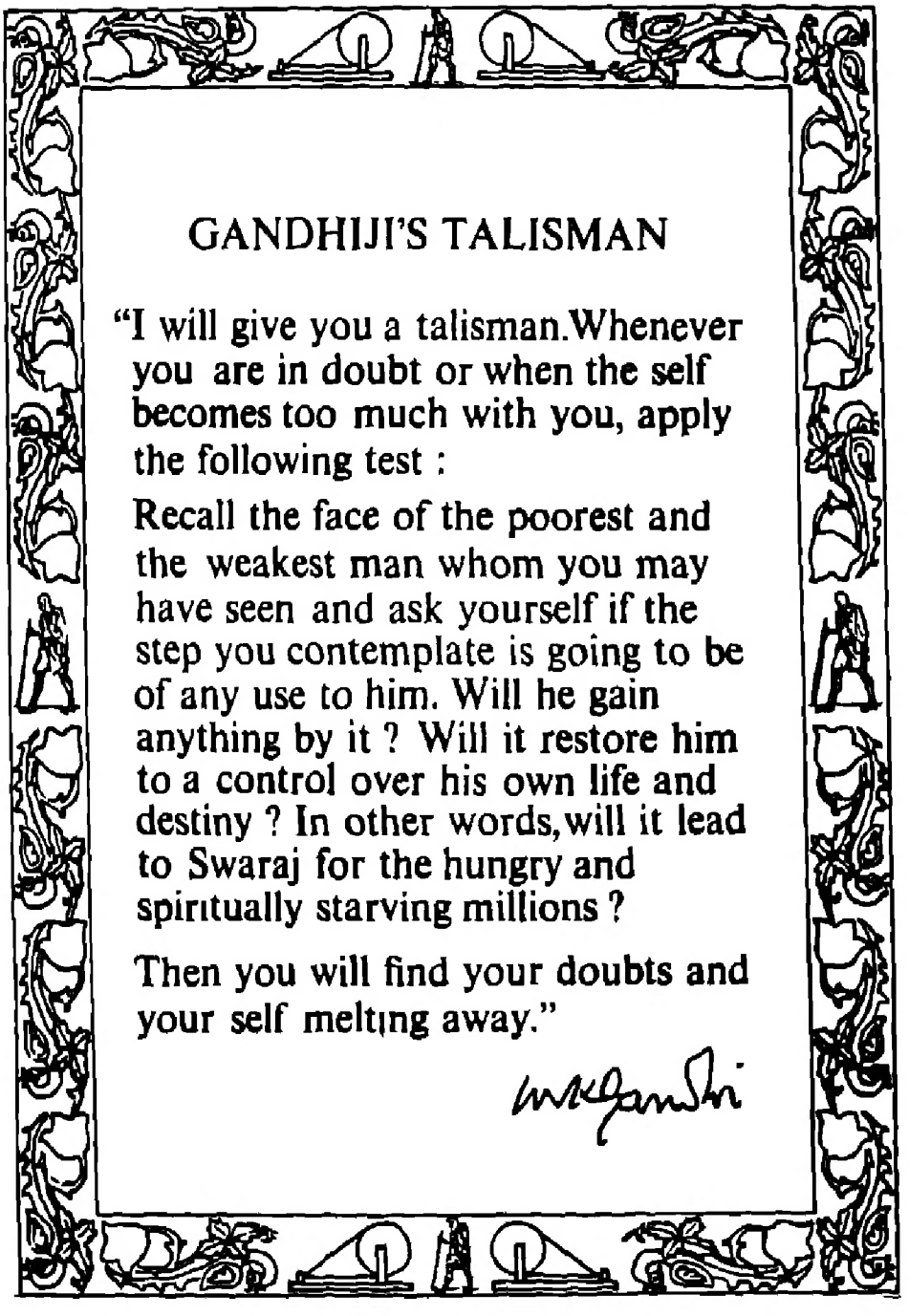

GANDHIJI'S TALISMAN

"I will give you a talisman. Whenever you are in doubt or when the self becomes too much with you, apply the following test :

Recall the face of the poorest and the weakest man whom you may have seen and ask yourself if the step you contemplate is going to be of any use to him. Will he gain anything by it ? Will it restore him to a control over his own life and destiny ? In other words, will it lead to Swaraj for the hungry and spiritually starving millions ?

Then you will find your doubts and your self melting away."

M K Gandhi

National Curriculum Framework

A Holistic View

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Abstract

The paper describes the salient changes in the educational system in post-independence India. The efforts of the NCERT in restructuring and reorienting the content and process of school education have been highlighted. In particular, the paper describes the salient characteristics of the National Curriculum Framework for School Education brought out by NCERT (2000). The framework gives stress on value education, reducing curriculum load, bringing out reform in evaluation system, strengthening national unity, preparing children to respond to challenges of globalization and information technology, relating education to work, linking education with life skills, education of special groups, integrating science and technology, and adopting of an integrated approach to teach social studies.

EDUCATION plays a key role in development of a nation. The education system in vogue in a country, reflects the ethos, aspirations and expectations of a particular society. As aspirations and expectations of each generation vary with time, constant review of curriculum becomes an essential exercise. That is what makes the task of review of curriculum extremely important, which needs to be addressed with utmost sincerity.

Many of the drawbacks of present educational system of India are traced back to India's colonial past. However, very little effort has been made to improve educational system in the proper perspective during the colonial period. Although British education system made Indians abreast with concepts of democracy but was based upon the interests of elites. It was only Gopal Krishna Gokhale who raised the voice for education of the masses against the downward filtration policy supported by the Indian elites

Education is the key that unlocks the doors to modernisation. Statements like this are gaining acceptance as truism by many nation builders, policy planners and scholars interested in the modernisation process, once regarded as an essentially conservative, culture preserving, culture transmitting institution, the educational system now tends to be viewed as the master determinant of all aspects of change with the constant change in the curriculum following different steps.

The first step in this direction was the formation of Secondary Education Commission (1952-53). It mooted the idea of starting multipurpose school and recommended a eleven-year school system This attempt was carried further by the Education Commission (1964-66), popularly called Kothari Commission. It took a more comprehensive view and also reviewed the impact of implementation of Secondary Education Commission. It suggested implementation of 10+2+3 system which was accepted by the Government and was spelt out in the National Policy on Education (NPE) [1968]. The policy "envisaged a radical transformation of education system to relate it more closely to the life of the people, provide expanded educational opportunities, initiate a sustained intensive effort to raise the quality of education at all stages, emphasise the development of science and technology and cultivate moral and social values." It is of utmost importance as a common educational structure, i.e., 10+2+3 system was accepted for the whole country.

The year 1961 was a very important time in the history of Indian education for the fact that it saw the establishment of National Council of Educational Research and Training (NCERT) at New Delhi. The NCERT was entrusted with the task of suggesting changes in school education and preparing curriculum. It gave a concrete shape to the recommendations of Education Commissions. As suggested by NPE (1968), the *Ten Year School System — A Framework* was brought out in the year 1975. This was in fact the first attempt to "restructure and re-orient the content and process of school education based on National Curriculum Framework". The 1975 document provided the necessary thrust to teaching of environmental studies, science and mathematics as part of general education curriculum from the primary level, which ultimately resulted into national movement for popularising science among school children.

By this time importance of vocationalisation of education was also recognised and NCERT addressed itself to the issue. The document — *"Higher Secondary Education and its Vocationalisation* (1976) suggested measures in this regard It suggested flexibility in choice of vocations, determining vocations based upon economic needs and potentialities and consequent opportunities of work. It also looked upon various aspects related to the nature and scope to admission requirement etc., for the vocationalisation of education.

In the year 1977, Ishwarbhai Patel Committee was formed to examine the problem of curriculum load. It looked into the number of subject areas studied in primary and secondary stages and recommended that "Units to be studied under a given subject area, should by and large, remain same for all but stressed the need for flexibility so that the details of the units in a subject area would be worked out by boards of school education to suit their requirement." Other recommendations of the Committee included study of one optional subject from a prescribed list to permit pupils to develop special interest or talent.

Thereafter a National Review Committee on the Curriculum for the Ten Year School was appointed under the chairmanship of Dr Malcom Adiseshaiah. Its task was to review the curriculum of +2 stage of school education with reference to vocationalisation of education. It strongly supported the contention that learning must be based on work and strongly recommended vocationalisation of education.

In 1988, NCERT came out with *National Curriculum for Elementary and Secondary Education*, which was based on recommendations of the National Policy on Education, 1986 and its Subsequent Programme of Action. The document called for strengthening and restructuring of teacher education, National Literacy Mission and improvement of science education in schools. It emphasised on continuous and comprehensive evaluation, utilisation of media and educational technology and contributed to development of a national system of school education by ensuring uniformity at all levels and standards.

However, an indepth analysis would show that although much has been done in implementation of the recommendation, the situation has been far from satisfactory. In fact, the shortcomings of NPE-1986 were tacitly stated in Ramamurthy Committee Report in 1990. The report candidly accepted that inspite of best of our efforts "our education to this day continues to be governed by the same assumptions of British Raj." It went on to say, "Even today the principal beneficiaries of our education are the upper and middle classes. To them also we give wrong education..."

The Programme for Action, 1992 based on Ramamurthy Committee report emphasised on providing education to masses, promoting equality of opportunities, strengthening

vocational education, delinking degrees from jobs, promoting distance education and start open universities, promote value education, etc.

National Curriculum Framework, 2000

The world has seen a sea change in scientific and technological advancement in the last decade of 20th century. India too is not untouched by this phenomenon. It has led to change in the ethos, aspirations, demands and expectations of the new generation. As education is the means through which we prepare young generation to face challenges of life, it became imperative to bring adequate changes in school curriculum. Besides, it was nearly a decade that curriculum changes were last made. Thus, the time was perfect to get down to the task of reviewing the curriculum and prepare a new one The task, which began in 1999 culminated by the end of 2000, when a new National Curriculum Framework for School Education was placed before the nation. However, it was not just another curriculum framework. For the first time it addressed to the problem plaguing Indian education system and came with recommendations that were original and were intended to bring about long term changes. The important areas in which changes would be made are as follows :

Value Education

Value education had become more like a slogan in educational arena. Right from the time of independence, it was being felt that erosion of values was taking place and so value education needed to be emphasised. The University Education Commission of 1949, popularly called the Radhakrishnan Committee strongly recommended introduction of value education in university curriculum. It recognised that religious education was one of the important means of achieving it, and suggested a curriculum for inclusion of religious education in universities. The Sri Prakasa Committee in 1960 too stressed on value education and noted that absence of religious teaching would keep the children bereft of ethical and spiritual values, which were very important for making them a better human being.

Thereafter most of the major committees including Kothari Commission (1964-66), National Policy of Education (1986), National Curriculum for Elementary and Secondary Education (1988), Ramamurthy Committee Report (1990), POA (1992), etc. have emphasised on value education. In 1997, a Parliamentary Committee headed by S.B. Chavan which comprised of members of all political parties recommended "the integration of values and awareness about religions practiced in India in school education."

However, even after constant recommendations by various committees, we see change in the problem. In fact, erosion of values is being felt more in recent times. The National Curriculum Framework has for the first time addressed itself to the problem effectively

and has struck at its root. It has strongly recommended education about religions, which includes all major religions of the world. This has been based on the realisation that religion is a great source of values. Even Chavan Committee also observed this fact Besides, 83 universal values have been identified by NCERT and ways and means of its inculcation among students are being worked out. This is undoubtedly an unparallel step in the history of curriculum development.

Reducing Curriculum Load

Curriculum load is one aspect that has continued to worry educationists for long. As we have seen earlier the government appointed Ishwarbhai Patel Committee in 1977 to suggest ways to reduce curriculum load. The NCERT formed a working group in 1983 to study curriculum load in different states and came out with a report in 1984. However, the load has been increasing on children, and parents and community too have been getting desperate with the increasing load. This has been taken into account in the National Curriculum Framework 2000. It notes that curriculum load cannot be tackled by reducing number of books. Thus, it was essential to remove 'obselete and redundant' content. Besides, de-emphasis on memorisation and homework, removing overlapping of contents, and shift from content to process learning have also been suggested, which can play an important role in this direction. The curriculum aims to make suitable changes in the evaluation pattern to reduce the load. It also aims to remove mismatch between developmental capacities of children and curricular expectations on one hand and teaching learning methods on the other.

Change in Evaluation System

Evaluation is a very important component of the educational system. It can make or destroy the purpose of education. All policy documents pertaining to education stated that evaluation system in vogue was inadequate and required changes. The curriculum framework of 1975 and 1988 talked by continuous and comprehensive evaluation, abolition of pass-fail, introduction of grading system, etc. Programme of Action (POA), 1992 also recommended setting up of National Evaluation Organisation but it could not be implemented.

Reform in Evaluation System

National Curriculum Framework of 2000 has for the first time suggested far reaching changes in evaluation system. In doing so, it has laid emphasis on continuous and comprehensive evaluation with stress on both formative and summative evaluation. It talks of exposing students slowly to evaluation system, replacement of pass-fail system with grading system, suggests different methods of grading scholastic and co-scholastic areas including one for school based and public examinations, moots the idea of tutorials at higher secondary stage, introduction of semester system at secondary stage, etc.

Last, but not the least, the framework recognises the disparity among 34 boards of secondary and higher secondary education in the country. It suggests formation of national level body to evolve a national system of evaluation to compare students of various boards on same scale. Thus, it talks of making the idea of National Evaluation Organisation as suggested by NPE-1986 and POA (1992) a reality. This would help in bringing a semblence of uniformity in evaluation system in the country.

Curriculum for Strengthening National Unity and Promoting Nationalism

National Curriculum Framework aims to inculcate a sense of pride among students for being Indians. It has long been felt that contributions of India were not being reflected in the curriculum the way it should be. The new curriculum aims to rectify this shortcoming. The history, tradition and culture of various ethnic and religious groups and the rich cultural heritage of the country would be highlighted in the curriculum so that children learn to appreciate divergent cultures and view points in the right spirit. This is in accordance with India's pluralist society and composite culture. In this regard, special emphasis on freedom struggle highlighting sacrifices of people of different parts of the country with inclusion of North-East and other far flung areas, has been given.

The document stresses on teaching of ancient Indian indigenous knowledge system in which adequate representation would be given to thoughts of great men like Vivekanand, Sri Aurobindo, Dayanand Saraswati, etc. The Indian system of medicine like Ayurveda too would be emphasised so that children know about the rich past of the country and feel proud of it.

The framework also lays stress on teaching of Sanskrit, which unfortunately has been neglected all these years. It is a shame for us that more number of researches on Sanskrit language are being carried out in Germany than in our country. The Sanskrit language is synonymous of the Indian culture and civilisation. Besides, it is the mother of most Indian languages. Recent researches have shown that it is most suited for computers. Hence, the curriculum framework aims to correct important shortcomings of our educational system.

Preparing Children to Respond to Globalisation

Liberalisation, privatisation and globalisation are now a reality and the younger generation has to be prepared to respond to it effectively. These are direct results of tremendous technological advancement and market driven forces which transcend international boundaries. Thus, there is going to be more intensive cooperation and interdependence of nations and people in general for which younger generation has to be geared up. This necessitates designing and modification of curriculum accordingly

to inculcate universal values, spirit of tolerance, human rights, which would make the children learn to live harmoniously in global village. The disciplines like history, geography environmental issues too would have to be tailored accordingly, to be included in the curriculum.

Emphasis on Information Technology

The new millennium would be one of Information Technology (IT). It is one of the potent factors contributing to globalisation. Thus, the country would be lagging behind if attention is not paid towards this important innovation This has been recognised in the new curriculum framework and it proposes to include it from very early level. Besides, it would help to take education to the remotest areas of the country.

Relating Education to Work

Importance of work and vocational education has long been realised by various education committees. Although, it has been included in school curriculum, the outcome has not been satisfactory. National Curriculum Framework gives a serious thought to the issue and states that education would be meaningless unless it is related to work. It proposes to change approach in this regard and states that focus of voctional education, which until now was the organised industrial sector would be shifted to unorganised sector and self-employment as well.

Linking Education with Life-skills

In present times new challenges in the form of drug addiction, violence, AIDS, teenage pregnancy and other related problems have cropped up before mankind. Thus, education has to be linked to life-skills so that the gap between content and real life experience of students can be minimised. These would help in inculcating among students necessary skills to face above mentioned problems. Besides, they have to be told about issues like consumer rights, legal problems and spirit of questioning, quality of goods and services available to them.

In a nutshell children have to be made aware about problem solving, critical thinking, self-awareness, coping with stress, creative thinking, etc.

Education to Special Groups

Education would fail to serve purpose until it takes care of deprived and neglected groups of society. The National Curriculum Framework lays thrust to education of deprived section, girl child, learner with special needs, etc. It also states that it is essential to devote special attention to SCs, STs, OBCs and economically backward classes to bring about a cohesive society. It aims to make education accessible to maximum number of girls, specially of rural areas, removing a gender bias and discrimination from school curriculum and textbooks. It reaffirms the need to "develop and implement gender sensitive curricular strategies". The need for bringing social

justice has to be reflected in curriculum so that children start understanding its need.

Integrating Science and Technology

Curriculum would be losing objectivity if it fails to take into consideration the rapid technological advancement made in the last decade of 20th century. Hence technology has been amalgamated with teaching of science to recognise its importance. This would help the children to understand the interlink, interdependence and similarity between these two concepts, which would be in accordance with the need of 21st century

Integrated Approach in Social Studies

Till now social science subjects like history, civics, geography were taught separately at secondary level. However, all these subjects are interrelated and the concepts would be better understood if it is taught in integrated manner. It would make the concepts more meaningful and easy for students to be understood. Besides, it would help in representing them in a more balanced manner. It would also contribute in reducing the curriculum load.

Thus, the National Curriculum Framework of School Education (2000) has tried to address the existing lacunae in our education system and has suggested appropriate changes. It would not be an exaggeration to state that for the first time an alternative approach has been suggested for various problems plaguing the system. The stress on value education and making evaluation system more broad-based are sufficient proofs to this point. Although earlier curriculum framework and documents talked about these issues, those stopped short of taking concrete steps. Likewise many changes have been suggested, which would help to purge out defects in our education system and prepare children to take on the world in 21st century. This is what makes it a path breaking document.

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National Curriculum Framework for School Education — 2000

Issues of Quality and Relevance

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Abstract

This paper attempts to study the issues of quality and relevance of education of Indian school system in the context of National Curriculum Framework for School Education-2000. It argues that to know the level of quality of education in different states a composite index-EDI on the pattern of economic index like GDP or UNDP-HDI may be developed. Such an index may include a number of indicators. To identify such indicators studies/surveys undertaken from time to time on assessing the participation; on standard of learning achievement in different subjects at primary, upper primary and secondary level; on school effectiveness and learning achievement; and on life-skills have been evaluated. The sets of indicators used in different studies are further examined. In all 30 indicators having significant association with/contributed to the criterion have been identified and further grouped into 9 components based on their characteristics. These components are — pupil's background, home environment, learning conditions, school management, school academic climate, teacher component, state interventions (incentive schemes), literacy achievement, and investment in education. It is suggested that a suitable method to identify the most effective indicators and based on them a composite index needs to be developed.

WORLDOVER it has been realised that no country can progress without the qualitative development of its human capital. Education plays a key role in the development of human resources. As such, qualitative improvement of school education is of fundamental importance. In this direction several important initiatives have been taken for enhancing participation, curriculum renewal, capacity building of teachers, changing evaluation procedures, and so forth Among all these components, the curriculum renewal and making available good instruction material is of paramount importance. The curriculum not only responds to the future challenges resulting due to the rapid growth of knowledge and the emergence of new means and methods of communication but also it works as a vehicle for social transformation.

Curriculum designing and preparation of good instructional material are important exercises undertaken from time to time. For the first time, the National Council of Educational Research and Training (NCERT) published the *Curriculum for the Ten Year School : A Framework* in the year 1975 containing a common core along with academic component. Another document — *Higher Secondary Education and its Vocationalisation* was brought out in 1976 for the higher secondary stage. Based on these curriculum frameworks new syllabi and textbooks were prepared as models for the states and union territories. The efforts led to giving a concrete shape for restructuring of school education while adopting the 10+2 pattern of school education.

The NCERT published in 1988 another document *National Curriculum for Elementary and Secondary Education : A Framework* (NCESEF-1988) reflecting the major policy thrusts as enunciated in National Policy on Education [1986] (NPE-1986). The main focus of NCESEF-1988 has been on evolving a national system of education comprehensive of all educational processes, fully integrated with the social-cultural milieu and intended to develop potentials of the individuals. The salient features of NCESEF-1988 are as follows :

— Provision of equal educational opportunities to all, not only in terms of access to educational facilities, but also in the conditions of success,

— A common 10+2+3 structure of education,

— A national curriculum framework, which contains a common core along with other components, that are flexible,

— Introduction of norms of minimum levels of learning for each stage of education,

— Linkages with the world of work and development of entrepreneurship,

— Educational programmes for fostering among pupils an understanding of the diverse cultural and socio-economic systems of the people living in the

different parts of the country and for promoting national identity and unity,

— Provision of lateral and vertical mobility of learners for the purpose of further education and training through different modes of learning, and

— A technical support system for continuous improvement of the quality of education.

The document recently published in the year 2000 by the NCERT is *National Curriculum Framework for School Education* (NCFSE-2000) that responds to new societal and pedagogical changes and remains well within the broad parameters of the NPE-1986 (revised in 1992). The new important concerns are as follows :

— Building a cohesive society based on pillars of relevance, equity and excellence,

— Integrating indigenous knowledge and recognising India's contribution to world civilizations,

— Inculcating and nurturing a sense of pride in being an Indian, patriotism and nationalism tempered with the spirit of Vasudhaiva Kutumbkam,

— Universalising the elementary education and linking education with life skills,

— Value development at all stages of school education,

— Meeting the challenges of information and communication technology and globalisation,

— Reducing the curriculum load, Using culture specific pedagogy,

— Viewing the child as a constructor of knowledge,

— Recognising the interface between cognition, emotion and action,

— Empowering the teacher for curriculum development and implementation, and Coordinated decentralization of the process of curriculum development.

It may be observed that the new concerns as reflected in the NCFSE-2000 are laudable and in tune with the challenges currently being faced by the Indian society in large. Apparently it has given new thrust not only to quality education but also to relevant education. Based on the NCFSE-2000 the new syllabi have been prepared and new generation of textbooks are being written. Simultaneously the efforts are being made to orient the teachers on major concerns of NCFSE-2000 to enable them to understand and implement the desired changes in their transaction methodology.

2.0 What is Quality and Relevant Education?

Providing quality and relevant education are important concerns reflected in NCFSE-2000. It may be important here to understand the meaning of quality and relevant education. The Oxford dictionary defines quality as "degree of excellence". It is drawn from Latin word *qualis such as, of what kind.* Quality is a term generally used about relative

characteristics of an entity or a system with respect to time and space. The term is mostly used in comparative form either over a period of time or between two and more entities/systems. Whereas, the term education means "systematic instruction". The quality education thus means degree of excellence achieved in learning through systematic instruction.

The meaning of word *relevant* is 'bearing on'. How much bearing has the education on the life of the individual at present, for future and for the society he/she lives in? In other words, the quality education and relevant education are in-separable concepts. The aims of education are derived from basic conceptions about what a human should be and do. This leads to questions, viz., what makes life worthwhile, what makes relationship meaningful and what makes society grow. Answers to such questions lie with quality of education (including relevant education).

The Indian philosopher, Sri Aurobindo visualised the quality of education in developing the nature and power of mind, and successive teaching and training of mental and logical faculty. Gandhiji envisaged the quality of education in terms of the "total development of the child", i.e., the development of body, mind and spirit. *The United Nations Development Programme (UNDP) Study — Human Development Report 2001* mentioned that the qualitative development of human resources is very basic to all other developments. In fact, human resource is considered the real wealth of a nation. Human development is, thus, about expanding the choices people have to lead lives that they value. Fundamental to enlarging these choices is building human capabilities — the range of things the people can do or be in life. The most basic capabilities for the human development are to lead healthy and long lives, to be knowledgeable, to have access to resources needed for a decent standard of living and to be able to participate in the life of the community.

3.0 Indicators of Quality in Different Sectors

In the present day of globalisation and economic liberalisation the benchmarks in quality and competitive price have become the growth drivers. Indicators like Gross Domestic Product (GDP), Gross National Product (GNP), cost of living index, etc help us to understand the change in economic status. Further, the terms like Total Quality Management (TQM) and ISO 9000 certification have become common indicators of quality. The fundamental basis of these certificates is the interventions to improve the efficiency in the processes, management and customer satisfaction. These measures bring down the cost and improve the quality of product. These quality standards are also being implemented in other areas, viz., environment, healthcare, communication, energy, etc.

UNDP in its report has developed quantitative measures of human development known as Human

Development Index (HDI) for 162 participating countries of the world. India stands at the rank of 115. Such an index facilitates ranking the countries in order of human development. Also the trends in development are studied over a period of time, i.e. 1975-99. The three major components considered for HDI are : (i) longevity, (ii) knowledge, and (iii) decent standard of living. The component of knowledge is based on — (i) public expenditure on education, (ii) literacy and enrolment, (iii) tertiary students in Science, Mathematics and Engineering, and (iv) gender inequality in education. The point to be highlighted here is that the different parameters of education in quantitative terms are considered as a part of knowledge component, a major contributor to human development.

In school education also, on the pattern of GDP or HDI, there is a need to develop a composite index of quality education considering all the states/UTs in the country. Further within each state the index may be developed for the districts and blocks. Such an attempt would go a long way in helping the policy makers and educational administrators to monitor the quality of education and to take necessary corrective measures.

4.0 Constitutional Provisions and Policy Initiatives towards Achieving Quality Education

Government of India has taken various initiatives by making constitutional provisions and formulation of education policies not only to increase the provision of educational facilities but also to improve the quality of education. The foremost effort has been to fulfill the constitutional commitment enshrined under Article 45 for providing free and compulsory education to all children upto age of 14 years. The 42nd amendment of constitution incorporating education in the Concurrent List inter-alia emphasized on standard and quality of education while placing major responsibilities on Central Government. The 73rd and 74th amendments in the constitution provide constitutional status to local bodies in rural and urban areas to promote decentralized management of education and participation of community in promotion of education. Further, the recent 93rd amendment of constitution makes provision of 'education as a fundamental right'. All these constitutional provisions pave the way for effective implementation and monitoring of educational programmes to improve the quality of education. The National Policy on Education 1968 was the first landmark towards improving the quality of education. The policy emphasized on linking education with the national development with uniformity in educational structure and curriculum. The National Policy on Education 1986 was the second major initiative to bring out the improvement in the quality of education.

Government of India in collaboration with different states launched several programmes to actualize the goal of NPE-1986. They include : (i) Operation Blackboard (OB) Scheme for providing minimum two large all weather rooms

with verandah alongwith separate toilet facilities for boys and girls, provision of at least two teachers and one of them a woman, and essential teaching learning material including blackboards, maps, charts, laboratory equipments, etc. in primary primary schools, (ii) Mid-day Meals Scheme for improving the attendance, (iii) Programme of Minimum Levels of Learning (MLL) with focus on the development of competency-based teaching and learning, (iv) Non-Formal Education and Alternative Schooling facility for out-of-school children, (v) Development of curriculum and instructional material (NCESEF-1988 and NCFSE-2000) to improve the quality of education, (vi) Capacity building of teachers, (vii) Several programmes with international financial assistance like District Primary Education Programme (DPEP), Andhra Pradesh Primary Education Project, Bihar Education Project, Uttar Pradesh Basic Education Project, Lok Jumbish Project (Rajasthan), and recently (viii) Sarva Shiksha Abhiyan — a holistic approach to achieve the UEE. Majority of these initiatives have been taken to achieve the UEE by increasing the access, improving the retention and providing quality education.

5.0 Basic Components Needed for Measuring Quality Education

There are several factors/components, which affect the quality of education. Identification of all such factors is a complex and difficult process. A number of research studies and surveys conducted from time to time have identified certain factors. The important ones are as under :

(i) Socio-economic background of the learner,
(ii) Provision of incentives for disadvantaged groups like SCs, STs, girls and children with disabilities,
(iii) Learning conditions, i.e. physical and educational facilities in school,
(iv) Availability of good instructional and supplementary material,
(v) Competent and dedicated teachers,
(vi) Supervision and monitoring of schooling process, and
(vii) Financial support.

It is desirable to empirically measure these components to provide the correct picture of the ground realities. These measures may be in the form of indicators comprised of a number of variables having common characteristics. It may be possible to develop a composite index comprised of these component indicators. It may be worthwhile to find out the set of indicators used in the studies conducted so far.

6.0 Indicators Used in Earlier Studies

Several attempts have been made at national/international level to identify and measure the indicators of quality education. These attempts are mostly made at macro level to find out the indicators of participation in the schools, to compare the performance of students in different scholastic areas across countries or across states within

a country, and to know the indicators of school effectiveness. The major findings of these studies are presented in the following sub-sections.

6.1 Indicators Related to Participation

India is the second most populous country in the world after China to cross-over one billion mark as per Census of India-2001. India covers only 2.4 per cent of the world surface area yet it supports and sustains 16.7 per cent of the world population. The national average literacy rate is 65.38 per cent. The female literacy rate of 54.16 is much lower than the male literacy rate of 75 85 per cent. These figures indicate that still there are almost one-fourth of males and half of females as illiterates. The States/UTs with female literacy falling below the national figure are Bihar, Jharkhand, Jammu & Kashmir, Uttar Pradesh, Dadra & Nagar Haveli, Arunachal Pradesh, Rajasthan, Madhya Pradesh, Orissa, Andhra Pradesh and Chhattisgarh. The situation explains the enormity of problem in the context of achieving the quality education as a developing country.

The various initiatives undertaken so far are mostly confined to achieve the goal of UEE. They primarily focussed on providing access to schooling facilities, improving the learning conditions, and increasing the participation. According to Sixth All India Educational Survey (reference date September 30, 1993) state-wise educational indicators at primary and upper primary school/stage in rural areas are given in Table 1 and Table 2 respectively. The indicators at primary stage are : (i) provision of educational facility within 1 km, (ii) enrolment ratio for total and girls, (iii) percentage of schools having upto 1 teacher, (iv) percentage of female teachers, and (v) percentage of schools having upto 1 room. Whereas indicators at upper primary stage are : (i) provision of educational facility within 3 km, (ii) enrolment ratio for total and girls, (iii) number of teachers per school, (iv) percentage of female teachers, and (v) percentage of schools having upto one room.

It may be observed from Table 1 that the enrolment ratio (percentage of enrolment to target child population) of total (boys plus girls) and girls at primary stage in rural areas are lower than the respective national average (82.65 and 71.82) in case of Uttar Pradesh, Bihar, Nagaland, Jammu & Kashmir, Rajasthan, and Andhra Pradesh. Among these states, Uttar Pradesh stands lower than the national average in provision of educational facilities and percentage of female teachers in schools; Bihar has higher percentage of schools having upto one teacher, and schools upto one room than the respective national averages; Jammu & Kashmir and Rajasthan have higher percentage of schools having one teacher than the national average; Andhra Pradesh has higher percentages of schools upto one teacher and upto one room than the national averages; and the position of Nagaland is not explainable with any of these indicators.

TABLE 1

State-wise Educational Indicators for Primary Stage of Education in Rural Areas

Sl.No. State/U.T.	Provision of Educational Facility within 1 km	Enrolment Ratio		% of Schools Having upto 1 Teacher	% of Female Teachers	% of Schools Having upto 1 Room
		Total	Girls			
1 Andhra Pradesh	97.62	77 58	70.05	38.89	24 65	55.34
2. Arunachal Pradesh	77.87	100 08	89.21	47 61	14.90	6.40
3. Assam	88.61	87.06	79 84	21.58	24.48	62.07
4. Bihar	95.51	64.34	46.62	24.81	16 82	36.54
5. Goa	97.01	100 39	97.55	20.34	53.84	26.19
6. Gujarat	98.78	102.99	92.82	32 02	24.59	47.60
7. Haryana	98.47	84.02	80.73	19.74	39.11	10 45
8. Himachal Pradesh	75.97	108.63	105.81	22 88	36.98	15.68
9. Jammu & Kashmir	92.37	70.89	59.16	38.39	32.53	26 06
10. Karnataka	96.58	101.14	93.43	30.94	25 86	29.92
11 Kerala	89.68	101.05	98.96	0.15	65.72	2 62
12. Madhya Pradesh	93 55	84.95	72 24	34.48	12.56	24.73
13 Maharashtra	95 82	105.17	100.30	20 53	25 55	45.72
14 Manipur	94.12	113 64	107.00	21.98	26 00	3.09
15. Meghalaya	87.97	106.42	107.13	38.40	43.07	48.92
16. Mizoram	95.77	127.87	118.99	21.42	34.21	2.26
17. Nagaland	95.05	67.65	66 32	7.28	28.04	0.00
18. Orissa	93.74	96.63	82.84	17.76	18.76	20.29
19. Punjab	99.32	95.00	91.28	12.34	51.84	6 02
20. Rajasthan	92 55	72.16	46.53	32.34	18.94	10.29
21. Sikkim	83.44	112.60	104.68	1.53	31.04	1 15
22. Tamil Nadu	99 53	109.11	105.98	13 68	41.51	29.02
23. Tripura	85.00	104.30	96.80	9.01	17.05	11.64
24 Uttar Pradesh	88.60	62 68	48.05	11.04	17.27	9.63
25. West Bengal	93.07	90.48	83.80	8.48	13 98	31.38
26. A. & N. Islands	81.75	114.42	110.36	11.06	36.15	7.73
27. Chandigarh	96.07	84.28	82.71	0.00	92.74	0.00
28. D. & N. Haveli	86.83	91.82	73.59	51.22	34.38	37.40
29. Daman & Diu	99.22	108.92	104 38	0.00	59.13	4.00
30. Delhi	93.83	106.55	108.73	0.66	44.98	2.63
31. Lakshadweep	99.73	123.75	120.27	0.00	34.43	0.00
32. Pondicherry	97 68	120 36	117.31	7.03	33.42	9.19
India	**93.76**	**82.65**	**71.82**	**22.88**	**23.50**	29.18

Source—Sixth All India Educational Survey

TABLE 2

State-wise Educational Indicators for Upper Primary Stage of Education in Rural Areas

Sl.No.	State/U.T.	Provision of Educational Facility within 3 km	Enrolment Ratio		No. of Teachers Per School	% of Female Teachers	% of Schools Having upto 1 Room
			Total	Girls			
1.	Andhra Pradesh	79 43	35.10	25.88	5.00	23.40	0 78
2	Arunachal Pradesh	54.39	47.83	39.33	7.00	15.17	0.77
3.	Assam	87.16	52.73	48.14	7.00	15.24	6.35
4.	Bihar	88 33	27.20	15.96	7.00	14.60	6.45
5.	Goa	92 87	84.58	79.81	7.00	52.58	0.00
6.	Gujarat	94.48	55.15	44.77	7 00	36.09	4.23
7	Haryana	93.26	57 13	48.68	8.00	34.97	0.72
8	Himachal Pradesh	78.22	83.54	76.20	5.00	20.64	10.51
9.	Jammu & Kashmir	86.78	52.90	40.68	7.00	28.26	3.27
10	Karnataka	91.42	49.09	40.31	5.00	28 00	2.03
11.	Kerala	91.84	96.52	94.80	16.00	63.52	0.56
12.	Madhya Pradesh	72.60	42.04	26 56	5.00	11.07	9.49
13.	Maharashtra	87 64	64.08	55.24	7.00	26.76	3.09
14.	Manipur	82 24	65.44	61.03	9.00	27.45	0 18
15.	Meghalaya	69.50	45.86	44 25	5 00	33.25	1.62
16.	Mizoram	83.38	57.34	54.33	6 00	18.06	0.24
17.	Nagaland	74.54	32.39	32.32	9.00	21.14	0.00
18	Orissa	87.88	46.69	36.74	4.00	44.00	1.71
19.	Punjab	89.68	60.13	52.42	6 00	11.00	1.22
20.	Rajasthan	79 00	37.18	14.42	7.00	14.86	0.84
21.	Sikkim	79.01	55.51	54.71	13 00	32.68	0.00
22.	Tamil Nadu	87.78	77.39	70.23	8.00	46.70	4.05
23.	Tripura	85.89	52.14	46.74	12.00	17.60	0.50
24.	Uttar Pradesh	82.09	36.83	22.20	5.00	12.45	12.95
25.	West Bengal	87.51	40.53	33.24	6.00	21.31	1.09
26.	A. & N. Islands	77.03	81.75	79.87	15.00	43.43	0.00
27.	Chandigarh	99.30	59.07	57.39	13.00	90.38	0.00
28.	D. & N. Haveli	76.05	40.74	29.54	8.00	49.84	0.00
29.	Daman & Diu	100.00	72.50	67.04	6.00	36.08	0.00
30.	Delhi	99.05	92.35	89.84	11.00	45.20	1.15
31.	Lakshadweep	98.74	102.80	96.13	17.00	41.00	0.00
32.	Pondicherry	95.76	112.40	106.05	12.00	30.85	0.00
	India	**85.00**	**46.62**	**35.82**	**6.00**	**25.40**	**4.78**

Source—Sixth All India Educational Survey

The enrolment ratios of total and girls at upper primary stage in rural areas (Table 2) are lower than the respective national average (46.42 and 35.82) in case of Bihar, Nagaland, Andhra Pradesh, Uttar Pradesh, Rajasthan, West Bengal, Dadra & Nagar Haveli, and Madhya Pradesh. Among these states, Bihar has lower percentage of female teachers and higher percentage of schools having upto one room than their respective national averages; Andhra Pradesh has lower provision of educational facilities and number of teachers per school; Uttar Pradesh has lower provision of educational facilities, number of teachers per school, and percentage of female teachers; Rajasthan has lower provision of educational facilities and percentage of female teachers; West Bengal has lower percentage of female teachers ; D.&N. Haveli has lower provision of educational facilities; and Madhya Pradesh has lower provision of educational facilities, less number of teachers per school, lower percentage of female teachers, and higher percentage of schools having upto one room than their respective national figures. It may be of interst to note that at the upper primary stage three States/UTs, viz., Madhya Pradesh, West Bengal, and D.&N. Haveli have emerged, which were doing well at the primary stage. The state of Jammu & Kashmir, though lower at the primary stage, has improved its position at upper primary stage.

Saxena, Gupta, Kumar and Kaul (2000) studied the contribution of incentive scheme to girls' participation in primary schools. In all 23 indicators were considered. The indicators having positive association with girls' Gross Enrolment Ratio were — availability of schooling facility, supply of cooked meal, supply of free textbooks, free uniform, and attendance scholarship.

MHRD (2001) developed an Educational Development Index (EDI) considering 16 indicators grouped into four parameters, viz , (i) investment in education (total, plan expenditure, per capita investment on education, and percentage of revenue expenditure on elementary education), (ii) literacy achievement (total, female literacy, literacy of SC, and literacy of ST), (iii) universalisation of elementary education (GER of Classes I to V, girls' GER, SCs' GER, and STs' GER), and (iv) availability of educational facilities (percentage of habitations having primary schools within 1 km, ratio of middle schools to primary schools, percentage of primary schools with one room, and percentage of female teachers in primary schools). On the basis of composite EDI the 25 states are placed in rank order and the states with lower ranks from 20 to 25 are Madhya Pradesh, Andhra Pradesh, Rajasthan, Uttar Pradesh, Bihar and Jammu & Kashmir. Among the 7 Union Territories D.&N. Haveli has the seventh rank.

6.2 Indicators Related to Scholastic Achievement

Kulkarni, Lal and Naidu (1970) made scientific study of the achievement

in mathematics of about 80,000 students each at the end of primary, middle and high school stage of education in 15 states using parallel tests. In addition, 58 Central Schools and 30 Public Schools affiliated to Council of Indian School Certificate Examination were included in the survey. In all 14 indicators (Appendix 1) were considered important to study their relationship with achievement. The study revealed : boys achieved higher than girls; socio-economic conditions of the parents positively related with pupil's achievement; privately managed schools provided better teaching-learning situations; and no relation was found between achievement and teacher qualifications.

Srivastava and Singh (1991) studied the standard of scholastic achievement across 26 Boards of Examinations covering about 2.5 lakhs students at Class 10 and 1.6 lakhs students at Class 12 levels. The three common subjects covered at Class 10 levels were — Science, Mathematics and Social Studies. For Class 12 level, the subjects were divided into two groups, i.e., group A consisting of History, Geography, Political Science, Economics, Commerce, Accountancy and Mathematics; and group B included Physics, Chemistry, Biology and Mathematics. The students opting for any one group were to respond questions of any two subjects. The study considered seven indicators (refer Appendix-1) to find out their relationship with achievement scores in different subjects. The two Boards, namely, Council of Indian School Certificate Examination and Central Board of Secondary Examination generally performed better than all other boards at Class 10 and 12 levels. The privately managed schools performed better than the other management type schools. In majority of cases the boys achieved higher than the girls but there were few cases where girls performed better than the boys. The education and income of parents showed positive correlation with the performance of their wards. Mother's educational level exerts a greater influence on performance than the father's educational level.

Shukla, Garg, Jain, Rajput and Arora (1993) studied the attainment of primary school children in Language and Arithmetic in 22 states and Delhi metropolis covering about 66 thousands pupils of Class 4/5. The study considered 52 indicators (refer Appendix 1) in relation to achievement scores in the two subjects. The study revealed that over the states, the difference between mean achievement of boys and girls did not have the same direction. In some states boys did better than girls whereas in some other states girls did better than boys. In all the states, SC/ST pupils performed lower than the non-SC/ST ones. Further the father's education, facility for learning, and educational environment at home were positively related with pupil's achievement. The variable related to schools and teachers indicated somewhat weak relationship with achievement.

6.3 Indicators of School Effectiveness

Singh (1996) reported indicators of learning achievement in language and

mathematics at primary stage of Karnataka DPEP baseline assessment data covering 177 schools, 442 teachers and 2568 students. Hierarchical Linear Model consisting of 32 indicators as predictors were examined. The significant indicators found at pupil level were : gender, social category (SC/ST), and SES. The significant indicators at school level were : school Mean-SES, private management, independent primary schools, physical and educational facilities, teacher stay period, academic support to teachers, and the role of head teacher. The academic pressure helped in reducing the gender achievement gap and in turn improving the level of achievement. Singh and Saxena (1995) synthesized, using Meta Analysis, the results of eight DPEP states for 18 schools level predictor variables. The indicators of physical facilities, educational facilities, school academic climate (teacher frequently taking test and providing feedback, teacher assigning homework and correcting) indicated positive and strong association with school mean achievement in Language and Mathematics. The time devoted by pupil for doing homework indicated positive contribution to Language. While teacher frequently giving arithmetic problem to solve in the class contributed positively to Mathematics.

Saxena, Singh and Gupta (1996) studied the school effectiveness and learner's achievement at primary stage covering eight states, viz., Assam, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, and Tamil Nadu under DPEP. The study covered 1746 schools, 4879 teachers and 23700 students of 43 DPEP districts. The Input-Process-Output model was followed using Hierarchical Linear Modelling Method. In all 35 indicators (refer Appendix 1) relating to input and process were considered. The outcome variables were learning achievement in Language and Mathematics. The study revealed that among the pupils' background indicators, performance of girls, on an average, is lower than boys in all the states except Kerala. The SC/ST students performed lower than non-SC/ST students except the states of Assam, Orissa and Tamil Nadu. Parents' (father/mother) education and father's occupation are positively associated with pupil's achievement. Repeaters' performance is found to be relatively low as compared to those pupils who did not repeat in any grade(s). The important factors of schooling process identified in enhancing the learning achievement after adjusting for pupil's background were; teacher assigning and correcting homework; teacher giving arithmetic problem to solve in the class; teacher asking to read aloud and take dictation in the class; physical and educational facilities in school; teacher frequently taking test and providing feedback to students; teacher commitment; higher percentage of female teachers in school; teacher staying for longer duration in the present school;

parents involvement; and amount of time devoted to homework by the pupils. Indicators like teacher qualification, longer stay of teacher in the same school, access to teaching material, higher percentage of female teachers in school, and head teacher as leader has helped in reducing the gender achievement gap in some states. The state interventions in the form of Operation Blackboard (OB) Scheme, Mid-Day Meals programme, free textbooks, and scholarship for regular attendance are found to be having positive impact in one or more states.

6.4 Indicators Related to Life-Skills

Central Board of Secondary Education (1998) set up an expert group to identify the General Skills for Effective Adult Citizenship. The general skills identified for primary to secondary stage of school education, in graduated fashion, are broadly classified into following six categories :

1. Computational skills
2. Communication skills
3. Technological skills
4. Psychological skills
5. Learning to learn with love, and
6. Healthful living.

OECD Programme for International Student Assessment-2000 (PISA-2000) tried to access the knowledge and skills in Reading Literacy, Mathematics Literacy and Scientific Literacy based on authentic life situations of 15-years-old students approaching the end of compulsory education in 32 countries. The study provides considerable variation in levels of knowledge and skills between students, schools and countries. The socio-economic background of students and conditions of schools have effects on student performance. Some countries have mitigated the influence of social background and some have done that while achieving a high overall mean performance.

7.0 Overview of Significant Educational Indicators

It may be observed that in the aforementioned studies different indicators have been considered. These are : (i) participation rate at primary/ upper primary school/stage, (ii) learning achievement in Language and Mathematics at primary stage, (iii) achievement in Mathematics at upper primary stage, (iv) achievement in Mathematics, Science and Social Studies at Class 10 level, (v) achievement in History, Geography, Political Science, Economics, Commerce, Accountancy, Mathematics, Physics, Chemistry and Biology at Class 12 level, and (vi) knowledge and skills in Reading Literacy, Mathematics Literacy and Scientific Literacy of 15-years-old students approaching the end of compulsory education. The consolidated picture of significant indicators showing positive association with/contribution to criterion is as under :

1. Pupil's background — gender, social group, parent's occupation

and income, father/mother's educational qualification.

2. Home environment — time devoted to homework by the pupil, and parents involvement
3. Learning conditions — access to educational facilities, physical and educational facilities in schools
4. School management — private/ public sector management.
5. School academic climate — teacher frequently taking test and providing feedback, teacher assigning homework and correcting, teacher giving arithmetic problem to solve in the class, teacher asking to read aloud and take dictation in the class
6. Teacher component — teacher qualification, longer stay of teacher in the same school, teacher having access to teaching material, higher percentage of female teachers, and head teacher as leader.
7. State interventions — mid-day meals, free textbooks, and scholarship for regular attendance.
8. Literacy achievement — total literacy, female literacy, literacy of SC, and literacy of ST.
9. Investment in education — total expenditure, plan expenditure, per capita investment on education, and percentage of revenue expenditure on elementary education.

The data on all above-mentioned 30 variables under 9 different components for each state/district are generally not available in quantitative form. The MHRD, NCERT, Registrar General of India, and National Sample Survey Organisation periodically collect certain data. However certain other data are collected by undertaking special studies like achievement surveys. It may first be ensured that the data are converted into standard form for further analysis. A composite indicator for each component may be worked out by combining these indicators by assigning proper weights. Further one combined index using all component indicators with suitable weights may be arrived at This derived index could be named as Educational Development Index (EDI). The EDI may work as an index of quality of education on which different states/districts can be placed in a rank order. The states/districts showing lower ranks can be further evaluated on the basis of their status on each component indicator for taking corrective measures.

8.0 Few Suggestions

The curriculum and instructional material is crucial and basic input for improving the quality of education. The other components as identified above (section 7.0) are also equally important. In other words, all the necessary inputs in the school system are simultaneously needed to provide the quality education. This is complex and difficult task. It demands systematic planning and appropriate strategy for monitoring the implementation of educational programmes at all levels, i.e., from grassroots to national levels. Some

important steps suggested are as under:

1. The progress of educational development needs to be updated at a fixed interval of time at all levels, i.e , from block level to district/state/ national levels.
2. A permanent structure right from grassroots level needs to be created for regular collection of educational data on different components of education
3. The information and communication technology must be used to maintain and periodically up-date the database, and for quick transmission of required information from grassroot level to higher levels.
4. A composite index like Education Development Index (EDI) may be developed for distinguishing one state from another on quality of education
5. For the development of EDI proper methodology needs to be developed and tested
6. A large number of indicators contributing to educational development have been identified on the basis of earlier studies. These indicators may be helpful in constructing the EDI. Efforts may be made to enlarge the number of indicators in order to have the correct picture of educational development in different states/districts.
7. The data collected by other national and state level organisations on education or education-related variables might also be examined and included for construction of EDI.

Appendix 1

INDICATORS USED IN EARLIER STUDIES

Study Title/ Author	*Component/Composite Indicators*		*Indicators*
1	*2*		*3*
All India Survey of Achievement in Mathematics	Geographical	1	State
		2	Regions
		3	Sector

1	2	3	
Kulkarni, S.S., and others (1970)	School-related	4	Management
		5	Higher Mathematics
		6	Streams
	Student-related	7	Sex
		8	Age
	Other parent/student-related	9	Student's expectations
		10	Student's aspirations
		11	Student's attitude
		12	SES
		13	Parents education
		14	Facilities for study
Report of The National Study of Scholastic Achievement at Class X and XII Levels	School	1	Location
		2	Management
	Student	3	Sex
		4	Castes
Srivastava, H S., and Singh, Satvir (1991)	Parental	5	Income
		6	Father's education
		7	Mother's education
Attainment of Primary School Children in various States	Pupil-related	1	Location of school
		2	Age
		3	Sex
Shukla, S., and others (1994)		4	Father's occupation
		5	Caste
		6	Similarity of local language and mother tongue
		7	Pre-schooling
		8	Father's education
		9	Mother's education
		10	No. of siblings
		11	Separate place for study
		12	Help in school homework
		13	Availability of textbooks
		14	Availability of notebooks/ writing materials
		15	Time spent in helping parents
		16	Regularity in school
		17	Getting newspapers at home
		18	Getting magazines at home
		19	Available books other than textbooks at home
		20	Reading books other than textbooks

1	2		3
		21	Time spent in watching TV
		22	Home background
		23	Facility in learning
		24	Environment at home
	School-related	25	Professional training of the Headmaster
		26	Age of the Headmaster
		27	Teaching experience of the Headmaster
		28	Experience as Headmaster
		29	Location of the school
		30	Boys/Girls/Co-Ed
		31	Pre-primary classes attached to the school
		32	Classes in school (Primary/ Middle/Secondary)
		33	Years of existence of school
		34	Number of working days (1989-90)
		35	Total enrolment of Classes I-IV
		36	Proportion of teachers untrained
		37	No of teachers per class group
		38	No. of rooms per class group
		39	Separate room for Headmaster
		40	Facilities for teachers
		41	Facilities for students
		42	Number of books in the library
		43	Number of book bank in the school
		44	No detention policy
		45	Incentive scheme in the school
		46	Financial freedom to the Headmaster
		47	Percentage attendance (I-IV)
		48	Time given to teaching language
		49	Time given to teaching Arithmetic
		50	Operation Blackboard Scheme
		51	Existence of Parent Teacher Association
		52	Participation in special projects

1	2		3
School Effectiveness and Learner's Achievement at Primary Stage Saxena, R.R., Singh, Satvir and Gupta, J.K. (1996)	Pupil's background	1	Gender
		2	Caste
		3	Father's education
		4	Mother's education
		5	Father's occupation
		6	Ever repeated a class
		7	Socio-economic status
	Contextual	8	School Mean SES
		9	Per cent SC/ST
	Teacher's quality	10	Qualification
		11	Experience
		12	In-service
		13	Period in present school
	School resources	14	Access to teaching material
		15	Instructional material available
		16	Physical facility
		17	No. of teachers
		18	Pupil Teacher Ratio
		19	Primary and extended primary
		20	Per cent female teachers
	Climate of School	21	Academic press in Language
		22	Academic press in Mathematics
		23	Academic press test & feedback
		24	Academic press teachers give homework
		25	Academic press pupil doing homework
		26	Teacher commitment
		27	Parent involvement
		28	Head teacher as leader
	State Interventions	29	Operation Blackboard Scheme
		30	Material as per OB Scheme
		31	Mid-day Meals
		32	Free uniform
		33	Free textbooks
		34	Scholarship for regular attendance
		35	Other scholarship

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Creating 'Thinking Fingers' for Nation Building

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Abstract

The nation is undergoing total transformation on social, economic, political, cultural and environmental fronts. In the new changed society the new jobs will primarily be "thinking job" specially directed to meet the challenges of information and communication technology. The National Curriculum Framework for School Education (2000) aims to develop skills among students that would be required in the changed social context. It attempts to integrate work with education by introducing an interdisciplinary area of "Art of Healthy and Productive Living" at the primary stage, and pre-vocational courses at the secondary stage. The methodology of implementing work education programmes, emerging issues and concerns, and future challenges related to implementation of work with education have been discussed.

The National Curriculum Framework for School Education (NCERT, 2000) has been under scrutiny from various quarters for quite sometime now. But most of the criticism directed against it has been superficial in nature, political in intent and motivated by extraneous factors rather than based on any firm academic grounds. In a domocratic polity every new idea or approach must be put under well informed public microscope to reach an impartial and objective viewpoint. Seen in this perspective the original Framework document which is the "product of a long, participatory and democratic

process of wide ranging deliberations and discussions" needs careful and informed perusal in order to shift the facts from fiction.

A re-look at the conceptual framework presented in the said document would reveal a vivid array of educational imperatives in the face of the challenge to convert the 'industrial society' of yester - years to the present day 'information society' and ultimately leading it to the 'knowledge society' of tomorrow The stipulations enshrined in the Curriculum Framework, therefore, have to be critically analysed and understood in a realistic social backdrop keeping simultaneously in view the crisis that school education is likely to face in the new millennium. It has to be appreciated by one and all that an education system which was meant to serve the needs of an industrial society would require a resurrection and major transformation to serve the emerging needs of a cybernetic society.

Analysing the socio-cultural context the document rightly reminds that India is a multi-cultural and multi-lingual society and its culture is a living example of unity in diversity which is the result of assimilation of various strands of thought and lifestyle. It considers education as the most powerful instrument for achieving the desired goals. Some of the important national goals mentioned in the document are secularism, democracy, equality, liberty, fraternity, justice, national integration and patriotism (p 4). According to it, the curriculum must meet the learner's needs, societal expectations, community aspirations and internatinal comparisons (p.8). The curriculum has to lead to a kind of education that would fight against inequity and respond to the social, cultural, emotional and economic needs of the learners. The curriculum therefore, must stand on the three pillars of *relevance*, *equity* and *excellence* (p 9)

A closer scrutiny of these three pillars will indicate that a curriculum to be dynamic and responsive to the challenges of today and tomorrow must make itself relevant to the contemporary social needs and economic realities. It has to take into account the psychosomatic needs of the growing child on the one hand and the developmental requirements of the progressive society on the other. While the pillar of equity is essential for ensuring social justice, excellence provides the much needed quality dimension to the curriculum.

Under the influence of tremendous social changes at a fantastic rate and consequent rise in societal aspirations from education, the school curriculum today is in a state of a flux. The impact of these unprecedented changes is

bound to be felt on the objectives, content and methodology of education. Cybernetics and computers are the two most versatile and strong change agents, the influence of which just cannot be ignored. Children in schools today will be the first to confront the challenges of a technological society in the form of instantaneous data processing and retrieval, instant global communication of news and views, inter-planetary voyages, star wars and appearance of precision warfare coupled with long-term peace efforts.

2. Expanding Occupational World : A Challenge to Education

The present generation of school leavers will come face to face with an era which is characterised by total transformation on social, economic, political, cultural and environmental fronts. This transformation is not only extensive in dimension but also intensive in terms of impact. They will notice a sea change in the nature and extent of the occupational world which is expanding at a tremendous speed bringing in its fold a variety of emerging occupations. There are many occupations which have either disappeared altogether or undergone total metamorphosis. A study of the nature of new jobs in the cybernetic society indicates that these will primarily be 'thinking jobs' specially directed to meet the challenges of nuclear technology, electronics and communication technology. Such jobs would require higher levels of creative thinking, intellectual reasoning, computing and analytical skills, decision making and emotional intelligence. Employers would prefer to have trainable persons with fluency in thinking, flexibility in adapting, and originality in doing than a person specifically trained for a particular vocation. This , therefore, suggests a need for imparting basic transferable skills to all students. These generic skills would cut across various occupations. Every member of the educated work force of tomorrow would, in all likelihood require these skills in order to be effective and successful regardless of the vocation being pursued. Examples of such generic skills across all job families would include: (*a*) *Basic Competency Skills* — reading, writing, computation; (*b*) *Communication Skills* — speaking, listening; (*c*) *Adaptability Skills* — problem solving, thinking, creativity; (*d*) *Developmental Skills* — self-esteem, motivation and goal setting, career planning; (*e*) *Group Effectiveness Skills* — interpersonal skills, team work, negotiation; and (*f*) *Influencing Skills* understanding organisational culture, sharing leadership (Carnevale, Gainer, and Meltzer, 1990).

The Globalisation and open market economy have ushered in competitiveness in every sphere of business activity This has.resulted in newer occupational opportunities in the expanding service sector, financial services and product distribution network, entertainment industry, hospitality industry, the growing private and self - employed sector. In order to make education responsive, relevant and need based commensurate changes would be required in it both in terms of content and process to meet the demand for new and diversified thinking oriented working skills required by 21st century workplace fortified by desirable affective outcomes. Pupils especially those coming from the disadvantaged sections of the society will be able to contribute substantially to the efforts of nation-building if in addition to knowledge and information they acquire entrepreneurial skills and required work skills to meet the changing needs. This brings to focuss the twin programmes of Work Education and Vocational Education as recommended in the National Curriculum Framework. In a similar context the Parliamentary Standing Committee on Vocational Education in a recent communication stated that "about 52.25 per cent of the children dropouts are in Classes I-VII (as per the 1995-96 figures). Many of these dropouts are quite vulnerable and indulge in undesirable activities. This manpower can be utilized for constructive purposes if education is made attractive and relevant. Vocational Education is the best alternative."

Indian education after independence has witnessed some major attempts, as a consequence of recommendations of Commissions, Committees and Policy formulations to make the educational system vibrant, practical and relevant to developmental imperatives. But barring sporadic successes the system in general continues to perpetuate the colonial legacy Children in classrooms receive bookish knowledge as passive listeners. Teaching-learning takes place in an authoritarian environment emphasizing acquisition of facts and information mainly through *Shruti* (listening) and *Smriti* (memory) devoid of higher order thinking and active participation. The content and processes of education have little practical relevance to the needs and requirements of the dynamic world of work. Learning the Treasure Within — Report to UNESCO of the International Commission on Education for the Twenty-First Century explaining the concept of *Learning to Do* emphasises "the acquisition of a competence that enables people to deal with a variety of situations, often unforeseeable, and

work in teams, a feature to which educational methods do not at present pay enough attention. In many cases, such competence and skills are more readily acquired if pupils and students have the opportunity to try out and develop their abilities by becoming involved in work experience schemes or social work while they are still in education."

Education systems can no longer be expected to train a workforce for stable industrial jobs. It must instead train individuals to be innovative, capable of evolving, adapting to rapidly changing world and assimilating change. One of the principal functions of education is therefore, to enable the future citizens to take control of their own development and contribute to the nation-building effort through responsible participation characterised by initiative, teamwork and synergies as well as self- employment and entrepreneurship. UNESCO (1985) stated that Work Orientation in general education can improve not only the students' lives but also the lives of their families and communities. Therefore, it should occupy a pivotal part of the basic education and developmental goal of education. Going a step further the National Policy on Education (1986) accorded high priority to the programmes of work education upto the secondary stage and vocational education at the higher secondary stage. The Policy States : "The introduction of systematic, well planned and rigorously implemented programmes of vocational education is crucial in the proposed educational reorganisation...vocational education will be a distinct stream, intended to prepare students for identified occupations spanning several areas of activity."

3. Integrating Work with Education — New Horizons

The concept of work has been accepted by the new National Curriculum Framework as a significant feature of the educational process. The dichotomy between education and work should give way to the holistic, harmonic and synchronic development of the student as learner and as a productive member of the society. The Indian way of life has been influenced by the *Karmayoga* of the *Geeta* throughout the ages. Lord Krishna accords highest esteem to the path of *Karma* as compared to *Jnana* and *Bhakti*. As for educational and training process, the learning in the *Gurukul* system took place in a vocational work environment. The knowledge was gathered on the basis of work experience.

This eternal concept of work and its integration with education, therefore, forms the guiding principle for vocationalisation of education from

primary to the tertiary stage in various but inter-related forms.

3.1 *Stage-wise Integration*

At the primary stage the introduction of an interdisciplinary area of learning titled *"Art of Healthy and Productive Living"* has been recommended in the new National Curriculum Framework It integrates in its content the major concerns of health and physical education, art education and work education. Its main objective is to develop knowledge and skills of healthful living besides providing a nurturing ground for work habits, positive attitudes and moral values. This curriculur area gradually transforms itself into *Work Education* at the upper primary stage. Through the conduct of a variety of exploratory activities the students at this stage form positive self concept and acquire behavioural and work related practical skills which lead to strong character formation and vocational readiness. The essential attribute of work education is its manual character and performance orientation. The Curriculum Framework describes it as a thoughtful strategy to develop the understanding of facts and principles involved in various forms of work and to create a positive disposition towards work and workers Work activities or projects assigned should be purposive, meaningful, educative and suited to the developmental characteristics at a particular age level Social work and community service is also an essential component of Work Education.

The Prevocational Courses get introduced at the secondary stage which aim at imparting simple marketable skills. Essential activities to promote social interactions and entrepreneurial skills along with need based prevocational programme involving on-the-job practice enable exploration of personal vocational preferences. The prevocational orientation thus obtained facilitates choice of vocational courses at the higher secondary stage. Further, those intending to enter the world of work early acquire sufficient knowledge and skills for smoother transition and better vocational efficiency

After the ten year common programme of studies the stage is now ripe for exposing the students to differentiated and specialised courses in several areas of activities The National Curriculum Framework has recommended foundation courses for both academic and vocational stream. Foundation course meant for academic stream includes work education as one component which may take the form of community based developmental projects like adult education, afforestation, water management, road

building, etc Similarly General Foundation Course for vocational stream will comprise of general studies, entrepreneurship development, environmental education, rural development and information and communication technology.

A Generic Vocational Course meant for the students of the academic stream would provide much required practice in those generic skills which are not vocation specific but all the while lay the foundation for career success. It aims at improving the quality of general education by imparting basic skills, knowledge and attitude related to personal development and core competencies in the areas of social systems, information skills, resource management and technology. The Generic Vocational Course thus makes the students more trainable.

Instructions in *vocational electives* to the vocational stream students aim at developing through diversified courses skills and related knowledge required for a specific occupation or a family of occupations to prepare children for the world of work, especially for self employment. The underlying assumption is that gainful employment to the youth at an early age contributes significantly to the reduction of unrest, frustration and crime. Vocational education covers a wide variety of areas like agriculture, engineering and technology (including information and communication technology), business and commerce, home science, health and para-medical services and humanities. Each area in itself comprises of a large number of need based courses. The courses selected on the basis of their employment potential make the school education relevant to economic requirements and enhance the employability of school leavers, and ensure channelization of the youth energy to constructive pursuits through wage or self employment. The Curriculum Framework recommends that the scope and focus of vocational education must be extended beyond the organised sector of employment potentialities. The very nature of technological advancement and the highly competitive world demand continuous upgrading of knowledge and skills for every person in every walk of life. Vocational courses will be designed as self contained modules of varying duration to suit a multi-entry, multi-exit delivery sysem. Curriculum for secondary vocational education, therefore, would require to be suitably modified such that it plays an interventionist role for enhancing participation of girls, scheduled castes, scheduled tribes, other backward communities and physically challenged persons

4. Guidelines for Implementation

The preceding description indicates that, in keeping with the present day requirements, sincere efforts are being made at the national level to forge a closer link between education and productive work with the pious hope that it would not only lead to harmonious development of personality but also result in the familiarization and understanding of the scientific principles and processes involved in productive and service activities which would be useful in subsequent training and making a more informed choice of careers.

4.1 *Implementing Work Education Programme*

Work becomes joyful and enjoyable when it is purposive, meaningful and need based. Hence proper selection of work activities suited to different stages of education gains significance in this context. Identification of activities related to child's immediate environment which are at the same time playful, useful, simple and interesting would require exploration of the needs of the individual, family and the community. In doing so however, one has to keep in view the capabilities of a child or a group of children as well as the educative potential of the activity. This will also require an objective assessment of the resources available both in the school and the community.

Imaginatively planned and systematically implemented work education programme enlivens the institutional ethos Teaching-learning in this subject area has to be active, participatory and investigative aimed at harmonizing head, hand and heart through acquiring knowledge and skills, assimilating attitudes and values thereby internalizing the cognitive, motor and behavioural inputs A large variety of activities should be offered at the primary and upper primary stages so that children develop dexterity in handling tools and equipment, self-sufficiency in meeting their day-to-day needs and also discover their vocational aptitudes and preferences.

4.2 *Methodology of Implementation*

New and dynamic methods including the use of electronic media are to be adopted These may include drawing and sketching, preparing posters, diagrams, charts, graphs, models or collage, murals, collecting specimen, creating scrap books, displaying thematic features and creative collections on bulletin boards or student's creative corners. In order to make the conduct of work education activities a cooperative, collective and competitive endeavour performance oriented methods like games, puppetry, mime, dance, drama, role playing, community singing, poem recitation, excursions or field visits, reporting and interviews, survey, etc. can be resorted to. Study tours, camps, short-term attachments, inter school visits help in

broadening the experience base of child. Experimentation, demonstration, discussion, brainstorming, lectures, debates and exhibitions can be quite rewarding methods particularly while co-relating the work education activities to other subject areas. While story telling, quiz, school and community based projects, media analysis can be effective and interesting techniques, the experiences can be related to life and livelihood by supplementing classroom instructions with film shows, audio-video presentations, guest talks, computer aided instruction and so on.

Use of computers can play an important role in inculcating certain traits essential for efficient accomplishment of a work project. The children will get acquainted with the keyboard and mouse by playing games under window accessories Freehand sketches may be generated in Paint Children interested in mathematical operations may operate the calculator. Imaging software under windows can be used to see and manipulate the images or pictures. Basic geometrical figures can be drawn through MS-Word, Excel, Power Point and Paint software. Power Point may also be used to develop simple but imaginative slide shows. These presentations can be made lively by giving sound and animation effects Some entrepreneurial and decision making games can also be introduced. Internet may be gainfully used as a learning resource. Internet surfing, educative games and simulation packages may contribute effectively to the development of thinking fingers

It may be essential to reiterate that mechanical conduct of a large number of assorted activities may not suffice to attain the desired objectives. What is vital is to conceive and transact a sequential and graded programme of activities which (a) underscores the significance of work in the learning process, (b) stresses need for a product or service out of the work performed; (c) ensures smoother transition to the world of work; and (d) predisposes a majority of students towards selection of a particular vocation or career. In other words, the programme of work education is to be seen as a continuum right from the primary stage beginning with Art of Healthy and Productive Living to the senior secondary stage where a student chooses a particular career option.

At the upper primary stage the learners are exposed to a variety of work activities spanning several areas of occupations. Students experiment with tools, materials and techniques and also in the process of project implementation interact with producers, distributors and consumers. Work situations both within and outside school offer opportunities to children for exploring their own talents, capabilities and inclinations Learners concentrate on prevocational project areas at the high school stage. On-the-job experience, short-term attachment programmes or Earn While You Learn projects are some possible approaches through which students develop adequate skill

competence for being gainfully occupied in the world of work, if they so desire. Efficacy of the implementational strategies will be judged by the extent to which work education programme is able to bridge the gap between the world of school and world of work, between theoretical and practical and between general and vocational.

At the end of ten years of work education programme it may be safely assumed that the students are more knowledgeable about the world of work and are equally conversant with work culture and working conditions enabling them now to make informed choices of careers through vocational stream offerings at the senior secondary stage.

4.3 *Implementing Vocational Education Programme*

Preparation of skilled personnel, their retraining and increase in individual and national productivity are some of the commonly perceived objectives of vocational education. Career awareness, career planning, and career guidance also find a place among the objectives. A component of entrepreneurship happens to be a recent inclusion in vocational studies to prepare for self employment and small business development.

Effective implementation of vocational education programme requires considerable flexibility, allowing for local level initiatives and close interaction with employers and employing, training, financing and placement agencies. The Scheme of Vocational Education (NCERT, 1988) as implemented under the Centrally Sponsored Scheme since 1988 was thoroughly evaluated by the Operations Research Group (ORG) in the year 1996. It observed that "although in many States the requisite structures for policy formulation, administration and supervision were in place . . the required structures meant for providing technical and academic inputs were largely missing." It further mentioned that "although the State Council of Vocational Education had been constituted in almost all the States...a separate vocational wing at the Directorate and especially at the SCERT level had not been formalized in several States." Again "the involvement of district functionaries in the implementation process of the scheme in a formalized manner was found to be non-existent in most of the States." The findings, therefore, present a strong case for decentralizing its planning, administration and monitoring. Success stories from other implementing States indicate that creation of district level capacities and decentralization of the decision making process at the district level yield rich dividends A number of crucial functions have to be performed at this level like selection of courses and institutions through district vocational surveys, identification of institutions for collaboration and work benches for on-the-job-training, etc. The district level agencies and functionaries are comparatively in a better position to identify community needs and also mobilize community resources.

At present facilities have been created for introduction of vocational courses in six major areas in as many as 6,476 institutions all over the country There are about 4.8 lakh students studying in more than 160 vocational courses at the +2 stage. It has been found that about 28 per cent of the vocational passouts were joining the world of work-wage or self employment after completing their courses. Some of the major weaknesses in implementation have been identified as lack of proper management structure in States, non-availability of trained teachers, lack of systematic school-industry linkages, poor practical training, lack of financial support for launching self-employment ventures, etc. Absence of a separate accreditating and certifying authority adds to the problem of quality control. These and many other weak links need special attention at both Central and State levels.

It is obvious from the foregoing analysis that a very large number of children from within the school going age group enter the world of work either by choice or by force of circumstances. The situation can not and should not be ignored simply as a case of school dropouts. The problem has to be seen and tackled in the perspective of manpower planning and development. As a matter of fact it is this group of young people who over the years form the large work force in the unorganised or informal sector. They being unskilled the quality of work produced or services rendered by them are not upto the mark. As a result indigenously produced consumer items find it difficult to compete with the products of other countries entering the market either in terms of quality or price. Simultaneously, it also affects adversely the quality of life of the people in general. Hence, suitable changes would be required in the system to impart skills and competencies to this target group for ensuring qualitative improvement in their life and livelihood.

5. Emerging Issues

Some emerging issues in this context may be summarised as follows :

— A literate society is the first prerequisite for participation in development, enhancement of health status, fighting economic and social exploitation, shedding prejudices and obscurantism, developing scientific temper and exercising the rights and privileges bestowed to an individual by a democratic society. Therefore, eradicating illiteracy, ensuring universal enrolment and retention and empowerment of various target groups are some of the important issues.

— Secondary education is the earliest inter-phase with skilled workforce. This stage of education has the dual responsibility of preparing the child for further education and training as well as for direct participation of dropouts in production or services at semi-skilled or skilled level. In order to link education to rapid economic changes, a much larger and stronger base of secondary education would be a necessary concomitant.

— In view of the peculiar societal needs arising out of regional imbalances and variation in pace of development, job-specific vocational education may have to continue for some time more. However, curriculum framers and pollicy makers will have to consider the global thinking which tends to favour minimizing the dichotomy between academic and vocational education by including elements of one in the other.

— The challenge of expanding service sector and increasing need for self-employment can possibly be met through inclusion of entrepreneurship education at all stages by suitably designing stagewise content to incorporate entrepreneurial elements in both academic and vocational curricula.

— Retraining and continuing education would be vital and have to be a regular feature to accommodate the changing skill profiles of the furure. Any pre-employment vocational training would require regular follow up measures since the obsolescence of skills and knowledge will be a routine feature. Therefore, the vocational education system to be effective and dynamic will have to design a wide variety of modular courses for all those employed. These may be transacted by accredited vocational institutes, enterprise based training or using distance cum contact learning mode.

— Distance learning mode is critical for mass approach to skill development and upgradation. It would be most appropriate to the needs of the large employed workforce and those employed in small scale enterprises The approach of education and training through multi-media packages is equally applicable to students whether enrolled in formal or open learning system.

— The vocational schools cannot remain totally dependent on State funding. It is time the educational managements and administrators begin thinking in terms of resource generation for making themselves fully or partially self supporting. Resource generation is possible by production of goods and services, undertaking repair and maintenance work, conservation and recycling of resources and promoting agricultural, horticultural, floricultural and similar other remunerative projects in schools. This leads to the issue of establishing Production cum Training Centres either in individual institutions or created as a central facility.

— As high as 38.3 per cent vocational passouts were pursuing higher studies of traditional type. Therefore, an urgent issue of utmost importance is the need to design at the national level *Associate Degree Programmes* to be introduced in *Comprehensive Vocational Colleges* to ensure vertical mobility in specialised or

allied vocational areas by linking them to +2 vocational courses.

— District level *Career Guidance and Job Placement Cells* in each State along with *single window self employment* support system can greatlly enhance the employment/ self employment of vocational passouts.

— Establishment of a *National Vocational Examination Board* is critical considering the problems which exist presently in each of the Boards of Secondary Education looking after Vocational Education.

— Vocational Education as an instrument of an economic empowerment of girls and women is another societal imperative not simply on grounds of social justice but also because it accelerates the process of social transformation. The prevailing tendency of offering only soft options or only the courses commonly categorised under Home Science need to be reviewed in favour of making employability or income generation as the main criterion of offering a course to girls.

6. Future Challenges

6.1 *Reaching the Unreached*

The programme of vocationalisation of education needs to be considered from a much broader perspective and through various delivery systems — formal, non-formal and open or distance learning. The primary objective should be to provide and upgrade knowledge and skills of the population at large. With the open learning systems coming of age in India a variety of target groups can now be reached through open vocational education. These groups which have remained unreached hitherto include school dropouts, working learners desirous of improving skill or general competence, the physically and mentally challenged, girls and destitute women, adults and also those living in rural/tribal or far flung areas where facilities for vocational and technical education are not adequate. This would require the curriculum to be developed on modular pattern with provision for accumulation of credits through multi-entry and multi-exit system. These self contained modules will have to be competency based indicating performance criteria for certification.

6.2 *Emerging Priorites in Curriculum Planning*

The new millennium is witnessing revolutionary nature of advanced technologies and their profound impact on industry, economy, employment and education. The shift from 'muscle power' as a productive force to 'machine power' during the industrial revolution; and now a further shift from machine power to 'brain power' and 'mind skills' as essential programmable control devices has been aptly described as a shift from one age to another. In the present era which is poised to thrive on automation and information processing, human effort is required to come mostly from the mind in the form

of innovative and intellectual skills. Consequent to this new dimension new priorities in curriculum planning and educational programmes have to be visualized.

Some of the priorities in this context can be listed as multi-skilling involving higher order cognitive skills, practical skills, communication and inter-personal skills, flexibility, retrainability, entrepreneurship, credit transfer and continuing education.

Industry and Institute linked training systems have to be worked out at various levels to share resources and expertise. While the picture of rapid changes in the vocational world has its implications for content and process of education, it is also important to keep in mind that the rural sector in India as well as certain lower level vocations which are still prevalent on a large scale require multi-skills of traditional type and rather rudimentary skill formation. Even many of the urban services are still based on skills of the past and would continue to be so far some years to come. These, therefore, require commensurate development of human potential for solving the employment problem of the present. Both the formal and alternative education systems have to initiate skill training of population of varying age groups without being over obsessed by obsolescence due to fast changing technologies. Simultaneously, it would be desirable to infuse in the school curriculum the elements of technology education, the general vocational skills for all, entre-preneurship and better footing in science and mathematics and communication skills.

6.3 *Some Research Findings Leading to New Axioms for Vocational Education*

Oxenham (1984) drawing on research in certain developing countries found that there is no neat universal explanation of what employers want from school. Noah and Eckstein (1988) on the basis of a study of Britain, France and Germany reached a similar conclusion. The demand from employers is not exactly for prevocational courses relating to specific occupations or families of occupations. Rather, the emphasis is on better teaching of basic communication and computation skills. Sen Gupta (1997) Psacharopoulos (1988) research in Colombia and Tanzania showed no labour advantage of graduates from vocationalized courses — neither in terms of success in finding employment nor pay levels when employed. Wilms (1988) reviewed empirical researches carried out in United States from 1970 to 1985. He concludes that the outcome of vocational education in schools do not accord with the lofty aims, notably that this education fails to improve the student's chance of success in the labour market. Rapid technological advancements and the need for competing in a world market require an innovative work environment wherein workers solve problems, create ways to improve the methods they use, and engage effectively with their co-workers (Bailey 1997; Packer 1998). Job

specific technical skills in a given field are no longer sufficient (Askov and Gordon, 1999)

Many U.S. and international authors point out the importance of continuously developing skills beyond those required for a specific job, and they identify *generic employability skills* that enable individuals to prove their value to an organisation as the key to job survival. While there is overwhelming evidence and subjective views to support generic vocational preparation, there is also a strong case for continuing with job specific pre-employment vocational education in general schools or specialized vocational/technical schools especially in the developing countries of Asia having vast rural sector, rich traditional arts and crafts and a big unemployed workforce.

In view of the above findings the new axioms for vocational education may be started as .

(i) Vocational should be delinked from employment and linked to development, saleable skills for every one by 10+ and 12+.
(ii) Most job specific courses should be delayed to post +2 levels and to specialized institutions.
(iii) Organised industries have not much to offer, unorganised sector should be targeted.
(iv) Open learning system should be developed to provide flexibility.

7. Conclusion

In the end it may be concluded that the twin programmes of Work Education and Vocational Education, as recommended by the National Curriculum Framework has the potential of transforming the profile of learners in line with the present day skill requirements as well as in favour of a thinking oriented adaptive working society. Systematic creation of intelligent, trainable and group-effective middle level workforce is crucial for faster and sustainable development. Working with hand and thinking with brain should go hand in hand for optimum results. The educators must appreciate the fact that the two processes of working and thinking must not be separated in any process of training. The moment these start functioning separately the society gets divided into repetitive workers on the one hand and thinking workers on the other. This divide is harmful not only to the social cohesion but also stultify the process of nation-building For a progressive society therefore, the desirable goal will be a judicious merging of thinking and doing in such a way that the pain and drudgery of a worker gives way to joy of work and economy in time, effort and resources. This is possible only when head and hand work in unison in the accomplishment of a developmental task — a situation aptly described by Gandhiji, as creating 'thinking fingers'.

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Implementing the National Curriculum Framework for School Education

Professional Support in Teacher Preparation

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Abstract

The effective implementation of National Curriculum Framework for School Education (2000) requires raising of performance level of teachers in content areas as well as their awareness about emerging issues and concerns. This demands providing adequate professional support to the teachers. Towards this end, various strategies, such as developing school complexes as resource centres, making teachers and managers of the system accountable by establishing criteria, standards and indicators of performance, and providing teachers access to information and communication technology, have been suggested. It is argued that there is an urgent need to make efforts in this direction.

TEACHERS in any country are one of the main pillars of society, responsible for educating young people for future careers for different walks of life. It is evident that unless both the quantity and quality of teachers are adequate at all levels, from primary upwards, an under-realisation of the students' ability is likely to occur. Teacher development is one of the main thrusts of national level agencies like the NCERT and NCTE. While most of the pre-service trainings are organised through One-year, Two-year and Four-

year teacher education programmes, the inservice courses to meet the new challenges are mostly planned centrally and implemented at the State and local levels by different institutions/ organisations (RIEs, DIETs, SCTEs, SIEs, SCERTs). These institutions are required to undertake special responsibilities which have been discharged successfully in the past through the organisation of inservice-programme like PMOST and SOPT However, despite these promising plans and programmes, a certain number of crucial teacher management issues still remain unaddressed (UNESCO, 2001). These issues include : (a) Improving the attractiveness and image of teaching profession through adequate career development, (b) Reducing teacher costs, (c) Overcoming the shortages or high turnover of teachers in the remote rural or under-previleged areas, (d) Optimising the utilisation and professional support of teachers from both quantitative and qualitative point of view; (e) Bringing teachers and managements closer; and (f) Increased transparency and professionalism of teaching staff management.

Out of the abovementioned training issues, the training and managing of teachers 'as human resources' is the major thrust of the modern systems. This concern has assumed more importance in view of the need for the effective implementation of the National Curriculum Framework for School Education-2000 (NCFSE). The NCFSE requires that the performance level of teachers be raised both in subject/ content areas and also their awareness level about the emerging concerns and issues.

Two categories of teacher development are clearly emerging : Extending Professional Support to Teacher Development Programmes, and Integrating Information Communication Technology (ICT) in Teachers' New Roles. The implementation of NCFSE will deal with these two broad categories of issues which could be addressed on priority bases.

Let us take into consideration the above two priority areas, one by one, and identify their components for being dealt with both in pre-service and in-service teacher training programmes.

2. Extending Professional Support of Teacher Training

2.1 *Training Support to Teachers*

It is now visualised that, by the year 2010, the goal of Universalisation of Elementary Education (UEE) may be achieved in terms of all four parameters, namely, access, retention, equity and quality. These four components form the focus of new approach called *Sarva Shiksha Abhiyan* — Education for All (EFA) and the Basic Education target will be reached by 2015, according to UNESCO's Dakar Declaration on EFA. The Dakar Declaration was a kind of stock taking and reiteration of Jomtien Conference of 155 countries on EFA held in Thailand in December 1990 This new declaration of Dakar Conference "stresses the need to place (by the teachers) the emphasis on the acquisition of useful knowledge...rather

than on learning by rote by traditional teaching methods." In addition to the existing system of teacher training through DIETs, three new categories of teachers are being trained namely, (i) Shiksha Karmis . a new distinct category of teachers; (ii) EGS teachers : Education Guarantee Scheme teachers, also called Gurujis, who are contractual locally hired staff, accountable to the community, employed in the framework of an innovative programme; and (iii) Alternative School (AS) teachers, who are also locally hired contractual teachers, accountable to the local community.

In the realm of secondary and higher secondary education, where the current enrolment figures are around 34%, greater access and equity need to be greatly stressed. Besides this, the study of science will now also include technology education at the secondary stage. The curriculum at senior secondary stage will comprise of Foundation and three Elective courses. The vocational stream has so far received only low priority which is evident from the fact that 'we have reached the enrolment of nearly five per cent of children in the vocational stream, as against the target of 25%. Life-coping skills have also been viewed impotant in the new curriculum. All these developments have implications for teacher training, especially for vocational subjects

In the area of secondary education there is another agency, that is, National Institute of Open Schooling, which has an enrolment of 4,00,000 students. The National Institute of Open Schooling caters mostly to the dropouts and other categories of children of vocational stream. The NIOS requires teachers with different orientation, especially in the production and use of self-instructional materials including Educational TV Channel and *Gyan Vani*, which is a composite name given to 40 FM Radio channels. These radio channels are to be launched across the country with 3.75 lakh hours of broadcast in a year. These channels will cater to the students of National and State Open Schools. The NCFSE points out, "At the higher secondary stage, the open school system may be utilised fully for both the streams, academic and vocational." For this system we would require teachers who have acquired training in the methodology of distance learning.

2.2 *Developing and Using School Complexes as Resource Centres*

Under the NCFSE it is also expected that the DIETs will be the main sources of resources support to the elementary school teachers. This idea was put into practice in the DPEP districts during 1996-2000. The NCFSE has now emphasised that the teaching resources would be generated and made available at the sub-district (i.e. Cluster, Block) or school complex levels. These centres would provide material and manpower resources for school improvement programmes. Instructional materials will also be collected at the resource centres and competitions are to be organised with a view to encouraging competitions among the teachers.

Teachers of the primary and secondary schools would participate in activities like teleconferencing and other self learning modes. Physical and human resources are to be pooled and shared by the school teachers at these centres.

It may be recalled that the idea of school complexes was mooted by the Education Commission (1964 - 66), and some states, including the state of Madhya Pradesh, tried this by forming school complexes consisting of Colleges of Education, BTIs, Higher Secondary and Middle Schools. Certain difficulties were experienced, including the problem of transportation and availability of certain other resources.

The NCFSE also points out that the schools should not function in isolation. Jean Claude Buchet, a Director of an NGO - 'Aide et Action' has suggested that four approaches be used to promote this objective namely, (i) increasing access to school and improving the quality of teaching; (ii) providing practical and productive activities drawn from local know-how and oriented towards the acquisition of modern tools and knowledge; (iii) involving society as a whole in the life of the school needs; and (iv) social conditions of school attendance.

2 3 *Accountability of Teachers and Managers of the System*

The first step in increasing the accountability of teachers is to outline the goals of each subject area specifically. It is to be followed by establishing *criteria, standards* and *indicators* for the performance of education system. The criteria for the performance of curriculum are the bases on which effectiveness is to be judged. We operationalise the criteria quantitatively in terms of numbers, pass percentage and punctuality of students. Lastly, the *indicators* are the measures selected to collect data regarding performance on a given criteria. For example, timely distribution of textbooks through authorised sales Book Shops is one basis for the evaluation of individuals in the supply of educational materials. Teacher accountability is being achieved through 'decentralised control' of education which is now in the hands of Panchayats at the Block and Village levels. The teachers are appointed at the community's own recommendation. This lateral bond with the community is a significant factor in reducing teacher absenteeism. Thus training in decentralising and supervision at the Block and Cluster level school teachers is a step towards increasing accountability of teachers. However, the concepts of accountability, commitment to children and the society will have to be internalised through good quality education and training in codes of ethics and value education for the new categories of teachers There is a need to examine the extent to which the DPEP projects paying attention to this aspect needs to be examined. Training programme in this respect needs to be rather concrete rather than abstract. It is also suggested that 'establishing a system of performance – based incentives for teachers and head

teachers would be helpful in increasing commitment. Teacher incentives include small financial increments, selection for special training programmes and professional credits given for promotion purposes. These indicators would not be easy to handle in a rather rigid system. Thus, training of teachers and para teachers is a more practical way of enhancing teacher accountability to transact the curriculum. In addition to teachers, both Headmasters and Principals will be required to play the role of managers and facilitators for curriculum implementation. They may be trained in the new components through activity approaches like self-instructional modular materials which was done in PMOST during the years 1986-88. We are now far more developed in training through multi-media approaches (teleconferencing, telecasts and broadcasts).

According to Kemmerer (2001), "Criteria, Standards and Indicators are the bases on which the programme is to be judged, the level of performance on each criterion desired, and the measures selected to collect the data on performance, respectively."

2.4 *Monitoring and Evaluation*

During the past 3-4 years, the staff of the SCERTs, DIETs, SCTEs and other institutions have been trained by the NCERT in monitoring and evaluation concepts. They would be further oriented in the new components of NCFSE so that they could suitably monitor the progress of the implementation process and provide solution to the problems as they arise. The NCFSE has specifically identified five elements of teacher education on which the monitoring and evaluation has to be done. These include : pre-service, in-service, life long and continuing education, extension programmes, and institutionally designed opportunities for professional growth of teachers/teacher educators. For example, it may be ascertained as to how the teachers are being provided training courses for their career advancement. At present these trainings are being organised at the Academic Staff Colleges of the Universities for college teachers. For school teachers there are other agencies like the Regional Institutes of Education.

2.5 *Net-working of Teacher Education Institutions*

At present, government and private teacher education institutions are working in isolation. There has to be collaboration and sharing of resources among them for implementing the curriculum. Privatisation has received sufficient attention in the past few years. There are a number of private colleges affiliated to a particular university but little interaction is taking place among them on matters like in-service training of teachers and teacher educators. Professional bodies of teacher educators meet only once a year. They can devise strategies to link NCFSE with teacher education curriculum developed by the NCTE in 1998. The enrolments in teacher education

institutions are insufficient to prepare teachers for the new subjects of school curriculum. The potential use of networking technology was highlighted by Bhatia (2000) in his paper titled 'Technology Support for Networking : Emerging possibilities'. He pointed out that "network now has been used by a number of agencies. The NCERT uses this technology for primary school teachers' training. In the country, there are about 7,00,000 primary schools and 14,00,000 to 15,00,000 primary school teachers and to train and orient them becomes a very major task."

3. Implementing Information Communication Technology (ICT) in Teachers' New Roles

The NCFSE points out that "the process of education can no longer ignore the social and psychological impacts of technology that structures information." Integration of ICT into school curriculum is recommended. The underlying implications of this integration makes the following demands on the schooling process and ultimately on the teachers.

3.1 *Implications of ICT for the NCFSE*

The learners will be oriented in the use of ICT for the National Curriculum Framework :

(i) The educational planner has to devise updated plans, financial and pedagogic, so that computer is not merely a subject of study but is properly integrated into the school curriculum.

(ii) The educator has to generate computer-based learning material in different subjects and in addition he is to be trained to have access to more information. With this information the teachers will become facilitators of learning.

(iii) There will be flexible curriculum models which will include inter-disciplinary and cross-cutting issues of different subjects.

(iv) Development of curiosity and inquisitiveness rather than mere technological skills.

(v) There is more than one approach to learning such as interactive video and radio lessons. Such programmes are provided by the AIR and Video Stations in all social sectors (health, education, social welfare etc.).

(vi) New instructional designs which help the teachers and learners raise their desire for learning in true holistic style of learning so that traditional learning is replaced by exploration and problem solving.

(vii) Encouraging participatory and interactive group learning. Answers to questions are readily available through e-mails or other modes.

(viii) The ICT has very important implications for the pre-service and in-service training programmes. Discussions are held in the group situations, decisions are taken and amendments are recorded.

3.2 *Goals of ICT and Curriculum Framework*

Under the NCFSE the ICT components could be provided according to the following five broad goals :

— Giving learners an opportunity to develop a minimum of IT-knowledge base and acquire necessary skills for application in their subjects of study.

— Establishing and enhancing connectivity between the school and outside world.

— Forming an integrated IT-based teaching and learning environment in the schools (e.g., installing ICT facilities).

— Encouraging and supporting effective thinking and independent learning.

— Developing new processes of education (e.g. problem solving, inferring, etc.). The new areas of curriculum (e.g. science and technology education subjects) might contain full integration of IT in education and accelerate self-included innovations. This is true in case of computer applications by the students. When the students work freely on computer they will devise their own solutions to the problems in different subjects.

3.3 *Key Components of IT-Based Curriculum*

An analysis of the policy guidelines given in the NCFSE indicates that there could be a few major educational areas where applications of ICT concepts could be relevant. These areas of education include : (a) Curriculum and assessment; (b) Provision of physical and technological infrastructure in schools; (c) Training teachers as human resource development activity; (d) Building educational infrastructural resources; and (e) Using ICT in educational administration and management

(a) Curriculum and Assessment : Out of the above five components, curriculum and assessment could be given priority as far as main objectives of ICT are concerned. The overall aim of IT-based curriculum should be "to present the learners with the possibility of mastering IT skills and concepts." The students and teachers will be enabled to use computers as a medium for teaching and learning. However, the use of IT in teaching-learning activity is based on the following four educational objectives :

(i) To increase and strengthen the teachers' range of skills and resources.

(ii) To enable a much wider variety of resources to be made accessible to the learners.

(iii) To allow for a greater degree of self and independent learning (e.g. self-instructional modules). Learners will be encouraged to broaden their experiences beyond the standard prescribed courses. The ITC may be used to encourage learners to play a

more active role in their own learning.

(iv) To enhance inter-active capability of IT-based learning resources which will be used to motivate the students and enable them to learn at their own pace.

The attainment of the above IT-based objectives has policy implications for the curriculum transaction at all stages of school education. Perusal of literature indicates that at the primary level, information technology could also be used as a medium for teaching and learning. This might continue upto secondary level with more and more subject teachers making use of IT. The school time table might allow free access to computers during the normal classroom time.

It is also observed that the acquisition of specific IT skills are to be assessed formally on continuous basis. Application of IT skills could also be assessed for different subject areas and in several ways such as application of IT skills in assignments and project work.

(b) Access to IT Resources : Access to IT by the teachers in their respective subjects could be done through a combination of a number of approaches such as the following :

(i) Provision for a number of computers could be made in the school staff rooms. Due to constraints of space restrictions in most of the schools, these computers should be portable. However, this appears to be costly exercise for majority of the schools.

(ii) Providing access to teaching facilities through computers and also subsidising partially the purchase of computers by the teachers.

(iii) Providing Wide Area Networking (WAN) and sharing of educational resources; increasing access, administrative applications.

(iv) Providing a variety of information sources through magazines, journals and internet.

(v) Training teachers in IT-skills such as word-processing, authoring and the sourcing of information by different means.

(c) Pedagogical Skills : Pedagogical training relates to the acquisition of concepts and competencies with the purpose of integrating IT for teaching and learning. Specifically the pedagogical function of teacher should include the following activities with respect to IT :

— Acquire basic IT proficiency and infuse a variety of strategies to attain learning objectives — IT and non-IT based.

— Apply pedagogical principles in designing IT-based learning activities.

— Use IT to develop learners' higher order thinking skills such as creativity and problem solving.

— Reflect on practices by highlighting one's own experiences.

— The training curriculum for the teachers could be of modular type,

comprising of both generic modules (e.g., using IT resources in class teaching and project field work) and subject specific modules (e.g. use of Internet for the retrieval of relevant information from websites).

3.4 *Illustrations of ICT-based Projects*

Given below are the projects which could provide a broad base for implementation of NCFSE components relating to information technology :

(i) Establishment of computer rooms in primary schools, wherever possible.

(ii) Training of primary school teachers in the Pedagogical Use of ICT in Curricular Learning Areas and Special Educational Needs.

(iii) Enhancing ICT teaching facilities at the secondary level, could be that a cluster of schools of same locality share the resources with each other.

(iv) Training of secondary teachers in the Pedagogical Use of ICT in Curricular Learning Areas.

(v) Provision of Equipment to a Computer Maintenance Unit, which could be installed centrally for a number of institutions.

(vi) Enhancing Efficiency and Effectiveness in the Educational Planning and Management Processes. There has been gradual switch over to the use of computer in the accounts offices, libraries, laboratories and workshops.

(vii) Procurement of Information Technology Equipment for the Documentation Centres (Libraries) of the institutions.

(viii) Student Training Management System (STMS). Administration of selection tests, admissions of students to various programmes can be done very fast. Educational profiles of teacher education institutions can be developed.

(ix) Production of Multimedia Educational Programmes.

3.5 *Recently Launched Massive Information Technology Based Programmes/Projects (1998-2001)*

Several institutions in our country are conducting programmes for the training of teachers and other categories of IT personnel in ICT. The M.P. Bhoj (Open) University is providing major inputs in developing human resources required for IT - based applications. Some of the major initiatives taken in this direction are given below :

(i) Computer Literacy and Studies in Schools (CLASS) Project is a major project funded by the Government of India and is being jointly handled by the Government of Madhya Pradesh and the University. This project covers 394 Study Centres in Government Institutions in the states of Chhattisgarh and Madhya Pradesh (1998-2001). The CLASS Project was originally initiated by the MHRD during the late' 80s in the Regional Colleges of Education (presently Regional Institutes of Education) and Technical Teacher Training Institutes (TTTIs). This fact

has been put forward by Rajput (2000) when he observed that "computers were first introduced into Indian Schools some twenty years ago. That is a long time. Still, the vast majority of our close-to-a million schools is yet to have any computing experience."

(ii) Computer Literacy and Awareness Programme (CLAP) is another major project being jointly handled by the Government of Madhya Pradesh and the University (i.e. MPBOU) for a very massive computer education. The main idea is to encourage non-government initiatives for making computer education available in our Institutions. The head of the institution is encouraged to get the facilities for training arranged by non-government providers and the University gives technical inputs and monitors standards of training to ensure quality (1998-2000).

(iii) Basic Certificate in Computer Operations (BCCO) : Looking to the major IT manpower requirement in the country a decision was taken by the University to work towards this goal:, BCCO is a self-financing scheme whereby a nominal fee is collected from the students and a six month course in computer education is conducted which can be offered concurrently with other programmes of study in educational institutions (1999-2000).

(iv) Headstart is a Project of Rajiv Gandhi Shiksha Mission to provide computer-enabled education and develop basic computer skills for all students in about 5,000 Jan Shiksha Kendras of Madhya Pradesh during the next three years. It seeks to quickly close information gap for students in the most disadvantaged situations like the remote tribal schools in the state. The University is the walk-along companion to the Rajiv Gandhi Shiksha Mission on the Headstart Project to provide technical inputs including generation of innovative software for the project on a fairly massive scale. The massive training of teachers required for the Head Start Project in basic IT is also being provided by the University (1999-2000).

4. Conclusions

This paper has basically dealt with the implementation of NCFSE by extending professional support to teachers which is visualised in several ways; (i) by training certain new categories of teachers; (ii) by establishing school complexes as resource centres; (iii) by increasing the accountability of teachers/other personnel; (iv) through continuous monitoring and evaluation; and (v) making use of networking technology. Next important issue examined is integration of ICT in teachers' new roles at different stages of school education. Certain ICT-based projects are suggested in the form of pedagogical skills and information technology may not be taught as a separate subject. It is also pointed out that, though ICT programmes were planned and teacher educators were

given short training some 20 years ago, yet the implementation of ICT has started through innovative projects only recently.

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National Curriculum Framework

Implication for Girls' Education

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Abstract

The paper derives implications of National Curriculum Framework for School Education (2000) for the education of girls. There has been alarming decline in the sex-ratio of girls, despite the fact that the law was passed in 1870 and that no religion gives a sanction to it. Further, the participation of girls in education has been low despite various initiatives taken by the Government. Education about different religions can check the practice of female foeticide. The new National curriculum framework also advocates for generating awareness about inequalities between gender, elimination of social evils like dowry, and observance of small family norms. It does have a strong focus on education of girls. Some workable strategies for improving girls' education have also been discussed.

THE Committee on the Status of Women in India (CSWI) Report in 1974 had warned the Government about the declining sex-ratio. The 1991 census had done the same. When we talk about the position/status of the girl child and the empowerment of women in 2001 we get shocked, because the decline in sex-ratio is alarming for girls and women. The provisional figures based on the decennial census for 2001 report the decline in the sex-ratio among children in 'Zero to Six' age group. *It is unfortunate coincidence that this is*

being reported in 2001 which is also the year of Women's Empowerment. If the nation does not wake up now then where will we find women whose empowerment we have been talking about for more than two decades!

The declining sex-ratio is a matter of national concern because this is also coinciding with end of the SAARC Plan of the Girl Child. India is a signatory to conventions on the child If the girl child is disappearing, one would like to understand as to why this situation has been reached. The reasons are historical. The girl child has been a victim of neglect from all points of view—health, nutrition, education and, she has faced a threat to her survival. New scientific technologies are being used to eliminate the girls by killing them in the foetus. Societal sanction has always been there—whether it is female infanticide and female foeticide.

Raja Ram Mohan Roy had re-interpreted Vedas to abolish Sati in 1829 by reinterpreting religious scriptures. The new National Curriculum Framework does emphasise the need to study religion. When an attempt like this is made with objectivity, there will be examples in many religions which favour girls' education as well as removal of social evils which have impeded girls' education.

The five high priests comprising Sikhism's Supreme religious authority have directed the Sikhs all over the world to stop practising female foeticide. The direction has gone further to say that any Sikh found guilty would be automatically excommunicated from the Sikh faith. A written order from the Jathedar (Head Priest) of Akal Takhat highest religious and temporal seat, has reminded Sikhs that the killing of daughters whether before or after birth is against the established Code of Conduct (April 2001). The Code clearly prohibits all the followers of Guru Nanak from establishing or maintaining any kind of relationship with a '*Kudi maar*' (a person guilty of killing infant girls). This order has been there because the incidence of this evil has been very high. This was highlighted by the recent census report. Punjab already had a low sex-ratio. It has been negatively affecting increased rate of female foeticide!

An order like this is expected to check the conservative sections of Sikhs who have been a part of societal sanction to this evil. Reinterpretation, if required or searching for such useful texts from other religious text could help in checking this evil in other communities/society.

The new National Curriculum Framework for School Education (2000) suggests education about religion. Many have confused it with religious education. Education about religion can go a long way in providing information about facts that many of those social evils which isolated women leading to their lower educational and social status were not prevalent because no religion gave sanction to them. Positive reinterpretation of many such things will bring about a change in attitude and society will begin to respect their baby girls, take care of them and educate them.

However, the National Curriculum Framework exercises a caution when it discusses the need for education about religion. It points out that extreme care has to be exercised so that no personal prejudice or narrow minded perceptions distort interpretation It is categorical about objectivity in an area which can easily be interpreted the manner in which the interpreter wants to !

The religion and its study had been demanded by several participants to six Textbook Conferences of the Council of Europe. They emphasised that religion had been a major factor in society in all periods of history and that "to avoid teaching it in whatsoever pretext for whatsoever period, is to be lacking in historical truth." They recommended very emphatically that textbook authors and teachers should not present one faith as superior to all others. (International Textbook Research, Vol. 21, International Textbook Research Network, News Letter 8, UNESCO, 1999, pp. 153-154)

Girls' Education : Need of Our Society

Education of Girls is very crucial because on it depends the education of families and society which in turn would positively affect the education of next generations (Women As Educators and Women's Education in E-9 Countries, UNESCO, 2000). An important factor that comes in the way of achieving universal elementary education is the low participation of girls. Education of girls is vital for effective socio-economic development, particularly in raising the health and nutritional status of the community, conforming to small family norm and reducing infant mortality.

The teachers' role and their responsibilities to enhance enrolment and retention of girls go a long way in promoting girls' education. They have to be sensitive to girls' difficulties and help them to achieve in classrooms.

There has been a shift in the concept of girls' education, from equality of opportunity in access to equality and empowerment. The National Policy on Education and its Programme of Action (1986 & 1992) stress on Education of Women's Equality and Empowerment. The role of education is envisaged as an agent for bringing about basic change. Education has to play a positive, interventionist role in empowering women. The National Education System has to foster new values through new curricula and textbooks by removing gender bias and stereotypic social evils. It also has to ensure training and orientation of teachers, epecially sensitization to gender and related issues. Education also has been given a responsibility of social engineering as well.

The National Curriculum Framework reiterates all that has been said in the NPE and POA (1986 & 1992). While stressing the need of making education accessible to more and more girls, both in rural and urban areas, it adds that *there is a need for recognizing the strengths and positives of each gender.* An emphasis is there on the need to develop and implement Gender Inclusive and

Gender Sensitive Curricular Strategies. This will have an added advantage of enabling the system to have *a generation of boys and girls, both equally competent.* They will be sensitive to each other. What is most significant in this Framework is that it emphasizes the fact that both girls and boys will grow up while caring for each other, sharing and become equals and not 'adversaries' The curriculum stresses on cultivation of proper understanding of and attitude towards healthy sex related issues and respectful attitude towards members of opposite sex.

When one looks at the educational statistics, one can observe that enrolment and retention rates of girls are lower than those of boys. The number of girls who have never attended school is higher than that of boys. The reasons for low participation of girls in education at school level, and later, is because of the factors which are well known. These are (i) community's/ society's prejudice against girls' education and preference for boys' education, (ii) absence of a desired demand for girls' education, (iii) parents' need for girls' help in sibling care, domestic chores or by the girls becoming an economic unit of the family, (iv) adherence to traditional female roles, (v) inadequate number of women teachers, and (vi) negative attitude of teachers towards girls in schools.

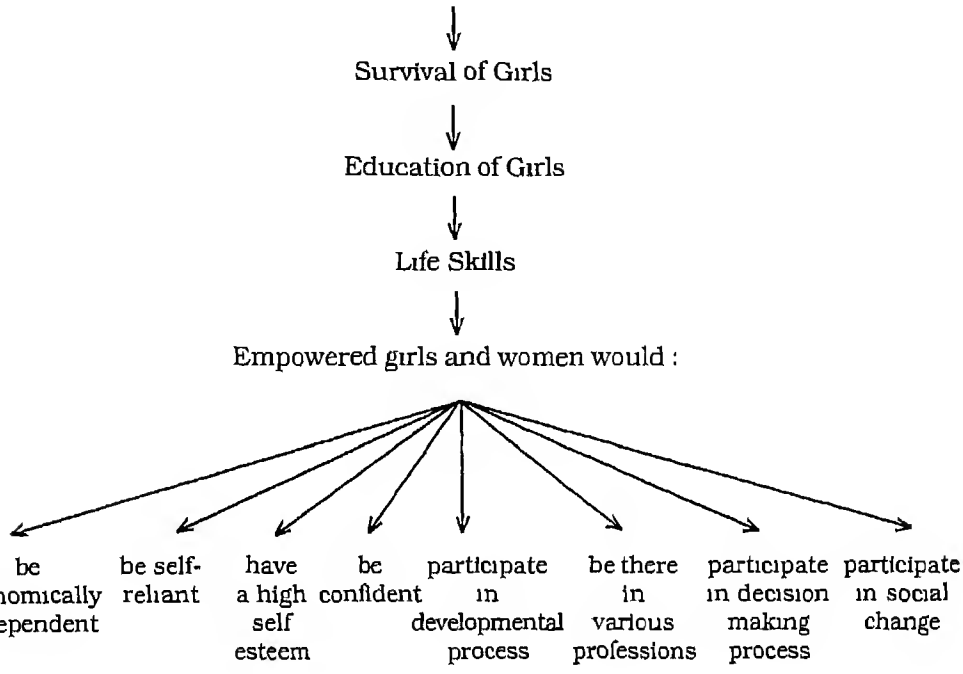
Poverty is one of the important factors, but since the Government is providing a number of incentives and facilities for promoting the primary education of girls, this aspect is being taken care of.

It has been realised that Universalisation of Elementary Education can not become a reality till the gender and regional disparities are addressed to. Gender disparities are there in enrolment and retention. Discrimination against the girls at the social level is the biggest impeding factor to achieving Education for All. Education system needs to address the special circumstances of girls. Girls still have less than 50% of enrolment at all stages. It is lower than that of boys.

At the primary stage there has been an increase in total enrolment by 5 77 times from 1950-51 to 1998 for girls. The increase has been more than 13 times at the upper primary stage. For girls it is more than 32 times At secondary and higher secondary stage, the increase has been 18 times and for the girls it is 52 times. Despite the increase in girls' enrolment at all stages, which is much more than the total and the fact that participation of girls at all stages has gone up — the percentages are still much below 50% at all stages. There are districts in Rajasthan where female literacy is less than 8%. The retention of girls impedes participation of girls in education.

The dropout rates at primary level are more for girls, 41.22 as against 38.62% for boys (total is 39.74). These are 60.09 for girls as against 54.4 for boys at upper primary level (total is 56.82). Gender mainstreaming is expected under Sarva Shiksha

Education of Girls can improve only when their survival is ensured

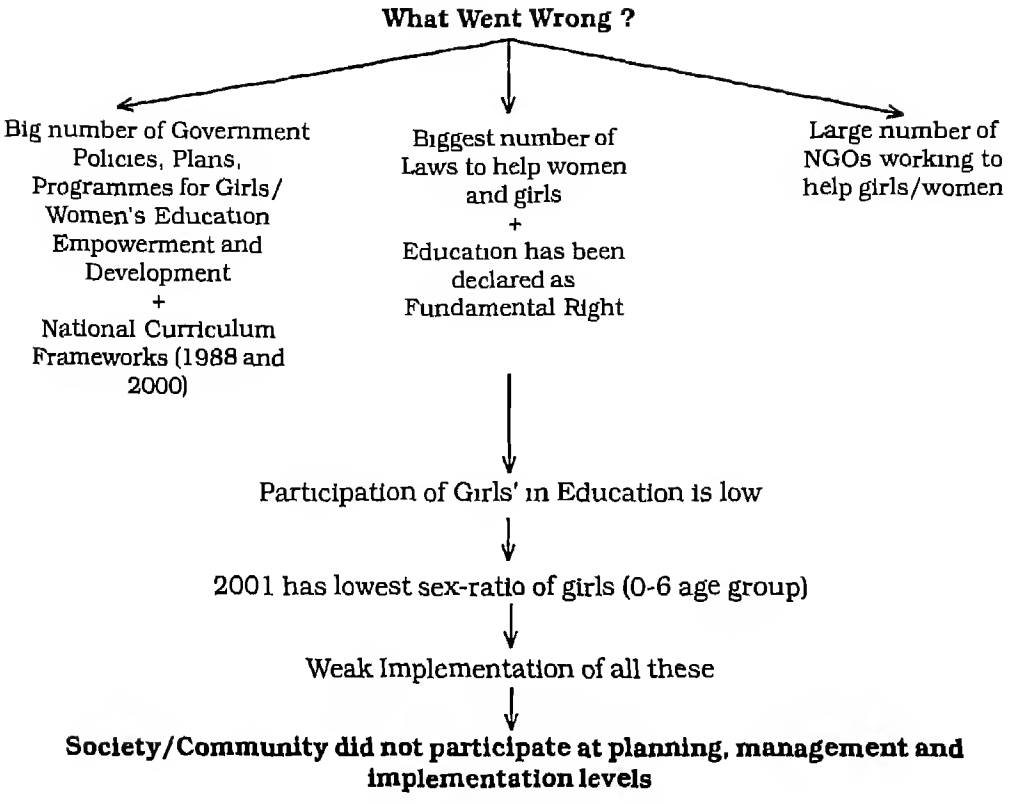


Abhiyan. A strong Gender focus has been built into the programme with a healthy incentive scheme for improving girls education and thereby achievement of Universalisation of Elementary Education (Working Group Report on Elementary and Adult Education, Tenth Five Year Plan, 2002-2007; Department of Elementary Education and Literacy. MHRD, Government of India, 2001).

Progress in the area of Elementary Education has been significant There has been considerable improvement in the participation of girls and children of Scheduled Castes and Scheduled Tribes. The fact still remains that Universalisation of Elementary Education is still distant because of low participation of girls in education (Annual Report, Department of Education, MHRD, 2001-2002).

Society/community has the potential of playing a very crucial role. It can ensure implementation of all the policies, programmes, schemes, incentives, laws for improving girls' education. By building up social pressure it can actually internalise all policies, programmes, schemes and laws which have only been institutionalized. The changes which take place with the support of community/ society can have a meaningful permanence (Devendra, 1994).

Universalization of Primary Education is one of the major goals and



a matter of national concern. This is being backed by a strong political will. There is no denying the fact that primary education provides basic competencies required by individuals to cope with life situations both at present and in the future. It provides an individual with social benefits and makes the person receptive to new ideas and practices. A strong foundation of primary education is vital for educational, social and economic growth, as well as for all round development of the child's personality *The National Curriculum Framework reiterates the role of education in empowering both boys and girls in developing and increasing their capabilities.*

The Government's Initiatives

The National Policy on Education (1968) had expressed concern for Girls' Education. It provided for equal opportunities for both boys and girls. The NPE-1986 and its revised version of 1992 and the Programme of Action give unqualified support to Universal Elementary Education. The focus is on universal enrolment of all children including girls. A separate chapter on Education for Women's Equality recognizes the role of education of an

interventionist for bringing about equality and empowerment of women. It is, however, more important to remove the difficulties of the parents, economic and provision for support services to bring the two crore out of school children. The number of out of school girls is more than boys' (Prime Minister's Speech : 15 August, 1994). This number must have gone up in the year 2002.

The Government launched the District Primary Education Programme in 1994 in 271 districts of 18 states (Annual Report, MHRD, 2001-2002, p.12). One of the important criteria for launching this in States and districts is that these should be low female literacy States and districts. Special attention is to be given to girls' education. The focus is on reducing gender disparities.

The Government had introduced Universalization of Girls' Education Bill in the Parliament in 1994. It had categorically stated the responsibility of the State to make education accessible to girls with all necessary support. The parents of the girls were to be responsible for ensuring that girls go to schools. Not sending a girl to school was to be treated as a cognizable crime. Although this did not become an Act, the Government has taken a very positive action by declaring Primary Education as a Fundamental Right for all children upto the age of fourteen (2003).

In Rajasthan, *Shiksha Karmi Yojna* and *Lok Jumbish* are taking care of girls' education.

The Government launched Balika Smridhi Yojana on 2 October 1997. The specific objective is to change community's attitudes towards the girl child. This scheme encourages enrolment and retention of girls in schools. It gives financial support to girls attending schools.

Mahila Samakhya is working to create a demand for girls' education in the districts of Uttar Pradesh, Karnataka and Gujarat.

Education of girls, especially the Scheduled Castes and Scheduled Tribes is one of the major areas of concern for *Sarva Shiksha Abhiyan* (2001-2002).

Janashala is a Government of India and UNESCO Programme. It aims to make education more accessible and effective especially for girls and children in disadvantaged groups. It is a block based programme and seeks community support.

Pradhan Mantri Gramodaya Yojana has elementary education as one of its priority areas. This can also help girls in their education.

A new subject *Art of Healthy and Productive Living* has been introduced which will help children at the primary level to learn in joyful situations. It will take care of their mental and physical health It will help them in decision making, problem solving, prepare them for leadership role. The approach of the subject is activity based. No textbook has been prescribed keeping in view the curriculum load. The Teachers' Handbook for Art of Healthy and Productive Living cautions the teachers that while planning the activities, teachers have to ensure that both boys

and girls are involved in planning, organising and management of these activities.

The National Curriculum Framework has come forward with a practical solution to education and other problems of girls and boys. *It suggests linking of education to Life Skills.* Education alone can not help children to face difficult situations. These will prepare children to deal effectively with day-to-day problems by developing in them positive attitude. Life skills will make both boys and girls confident, enable them to take critical decisions and earn a living. These boys and girls can help in bringing about social change.

Art of Healthy and Productive Living and Linking Education to Life Skills can help children to manage stress. The curriculum also provides for counselling and guidance in such situations.

How Can National Curriculum Framework Help Girls' Education ?

The survival of the girl child is critical to achieving girls' education and women's equality and empowerment. Girls are an asset to a nation. Their welfare strengthens socio-economic development. We need to work against prejudices, practices, customs and traditions which lower the status of the girl child.

If one carefully reads the National Curriculum Framework one finds that it has a responsibility of generating awareness about inequalities—by birth/social factor, about equality between sexes. *Equality between sexes, elimination of social evils like dowry are amongst the core components.*

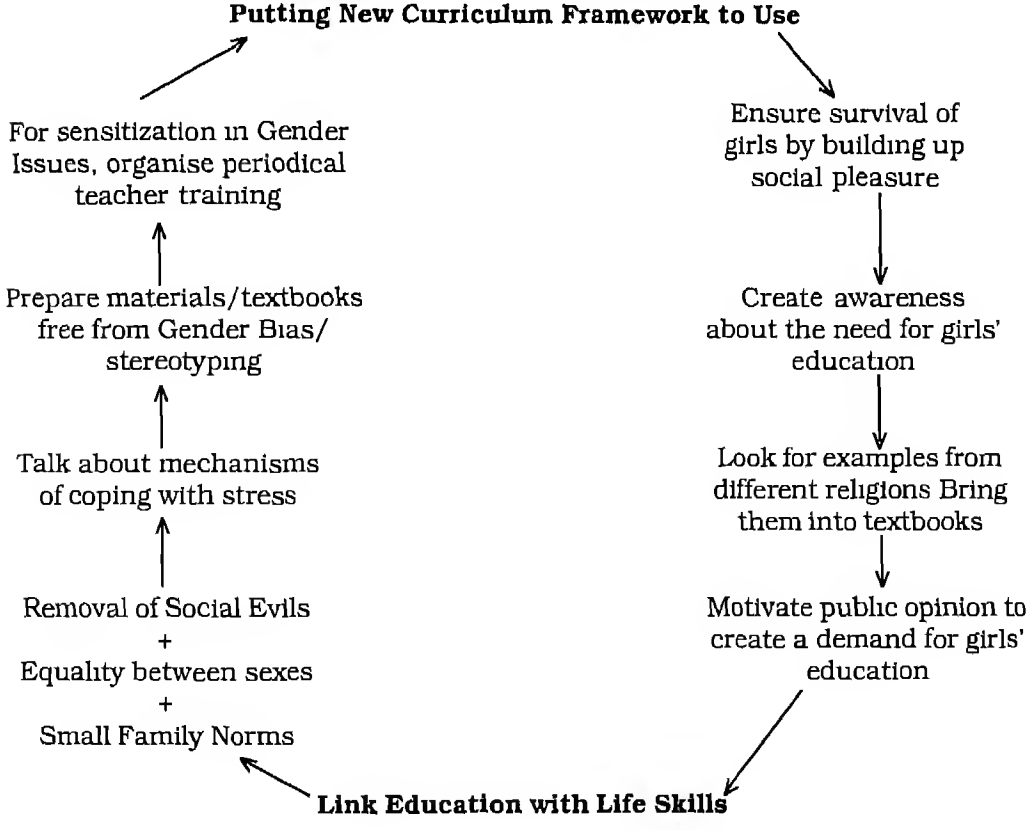
The girl child, who is an indispensable part of our society, is considered as a liability. The general societal concern has been lacking because the society has been conveniently giving its sanction to the neglect of and atrocities committed against the girl child. National Curriculum Framework provides for removal of social evils which have been responsible for the neglect of the girl child.

National Curriculum Framework, while generating awareness about inequalities between gender, can work towards equality between sexes. It has to see to the preparation of Gender Inclusive and Gender Sensitive Textual Materials. It has to ensure that curriculum and its transaction promote equality between sexes by adopting appropriate teacher training strategies. It can help in removal of social evils. It can look for examples from different religions for advocating girls education. It can ensure learning joyfully for both boys and girls. It can help girls' education in a more meaningful manner by linking it to life skills. Urban schools and institutions can use National Curriculum Framework for promoting girls' education, they can use it for rural areas for advocacy of girls' education

National Curriculum Framework reiterates that while developing the instructional material the language and content included in the textbooks should focus on core components like

equality between sexes, removal of social barriers and observance of small family norms. This will lead to healthy gender relationships, boys and girls caring for and respecting each other. They will learn to share responsibility in schools and at home. Not only this, boys will also learn to respect female members in their family. Such developments while promoting gender equality will also promote girls' education

The new NCERT textbooks are taking care of all such aspects which promote equality between sexes. Textbooks are likely to remain a necessary support for teachers. These will have an impact on children as well. "These are one of the most important educational devices in the whole array of teaching support tools. They help mould understanding in students which quite frequently lasts a life time." "Textbooks do not only mirror the national culture of education, but are also an essential complex instrument for building constructing and reproducing it." (International Textbook Research, p. 154).



Mass campaigns in favour of survival of girl child and giving her and a woman, human rights starting from neighbourhood, community and village, city/town will bring a positive change. These must become movements for saving girl child and women due to neglect, torture and atrocities. Committed against them must become Issues of Public Concern

Once a movement of the people starts, things will not only begin to improve for the girl child but policing by neighbours, community will help in bringing down crimes against her in the foetus and outside the foetus. The community will be able to keep a watch wherever a girl child is born, she will be able to survive and women will lead happier life.

Once the platform for girls survival is taken by the public, not only will the girls survive but their health and education can also be taken care of. When this happens, India can hope to have its future women empowered.

In Andhra Pradesh we have an example of M. Venkatarangaiya Foundation (MVF) where the programme ensures that all children from 5-14 years of age, both boys and girls go to school. Children from 5-8 years are enrolled in regular schools and children from 9-14 years are enrolled in special night schools. *"The essense of the programme lies in making the community accept the idea that no child should work"*. Community pressure is built to send children to schools. Community also funds the programme (The State of World's Children 1999: Education, UNICEF, p 48)

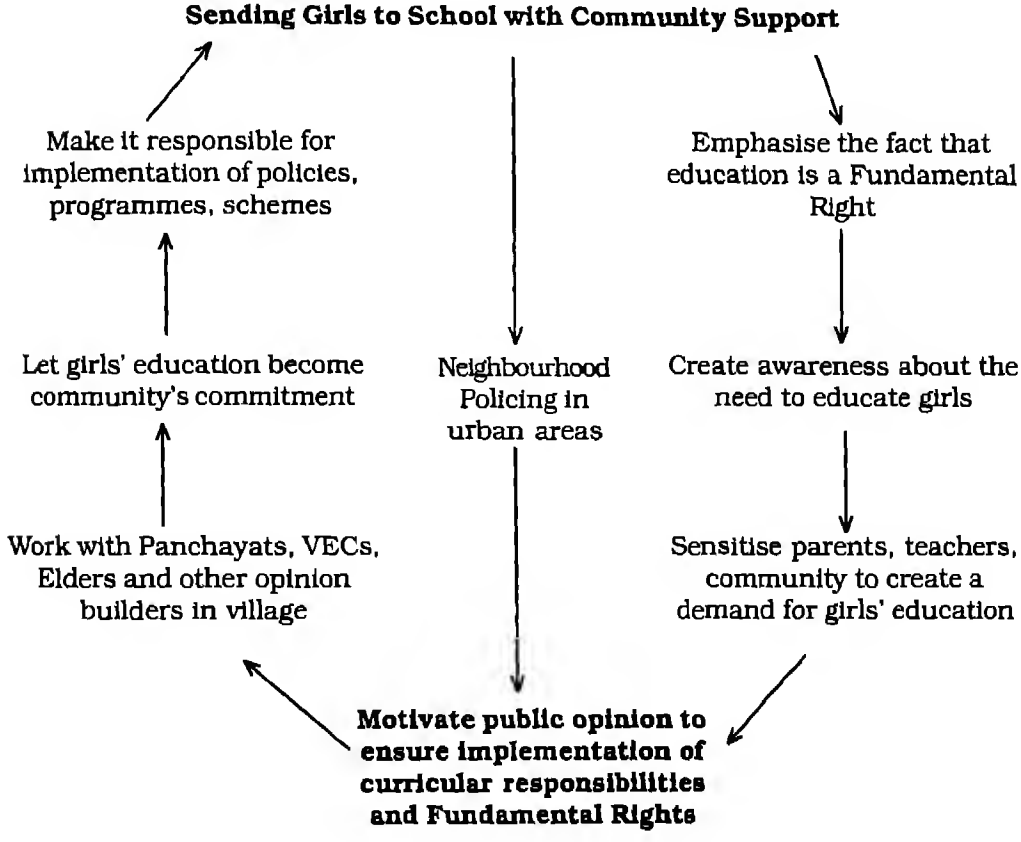
After a fairly successful anti-cracker, anti-plastic campaigns organised by Delhi school children, Delhi State-level Empowerment Committee has decided to involve children of school to work for empowerment of women campaign. This can be taken up in other states also.

There is an urgent need to sensitise our society which gives sanction to an act which will bring survival of our country to a questionable point. Sensitisation seminars need to be organised at the national, state and district levels. Mass campaigns need to be organised in the villages highlighting the threat to the life of the girl child (0-6 age group) and talking to the villagers about the dangerous consequences which the society as a whole will have to face without the girl child ! With the help of villagers a demand has first to be created for the survival of the girl child and later for her education so that we can achieve Universalisation of Elementary Education and have empowered women! There is need to sensitise all by each of the following playing their roles with responsibility and accountability:

1. The Government
2. Judiciary
3. National Institutions of Education
4. National Curriculum Framework (2000)
5. Schools in Delhi and rest of the country
6. Society/community.

Workable Strategies

1. Use National Curriculum Framework (2000) for generating awareness about equality between sexes, girls' education and about social evils which impede girls' survival, education and a healthy future in villages, towns and cities.
2. Mobilise women and community for creating a demand for rural girl child's education. The community must ensure that no family keeps a school going age group girls at home.
3. Involve the community and families for "Consciousness raising" for providing the girl child a caring and a healthy environment at home to enable her to go to school and develop a positive self image.
4. Provide solutions to the problems of the parents, economic and support services. The community can raise funds for girls' education and open creches for small children to release the girls to go to school.
5. The community can ensure that a rural girl is not involved in



hazardous operations. The community must take the support of the Village Panchayat, Village Education Committees, Women's groups and NGOs.

6. Older women in the villages, whose opinion matters, should be involved in 'Awareness Generation Campaigns' for improving the status of the rural girl child.
7. The community must identify problems, suggest strategies and see to the implementation of these and other programmes and incentives available for the rural girl child. The community must work to make these available to her.
8. In cities/towns neighbourhood concept can ensure girls of school going age going to school !

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On Linking Mathematics Education with Life Skills

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Abstract

The aim of this study is to establish reasonably accurate picture of the debate and actual state of why mathematics education should be linked with life skills. We start exploring world views regarding place of mathematics in school curriculum and then analyse aims and justification of changing role of mathematics education in the present age of technological society. The study has considered problem-solving situations a viable medium to link mathematics with life skills which entails us to the development of rich repertoire of mathematical problem situations related with child's real world environment and experiences.

BEFORE trying to address the problem area, it seems useful to consider the following general issues that arise from the specific social context in which mathematics is taught and learned :

Place of Mathematics in School Curriculum

Upto the present moment, we have not come across any curriculum framework at the national or international level, which does not figure mathematics as one of the core components. It is part of every school curriculum all over the world and perhaps the only subject occupying unrivalled position. This provides sufficient evidence that mathematics has achieved central place in school curriculum. One can attribute

a number of reasons for this state, but the major one is that mathematics has been seen for many centuries as the subject 'par excellence' in which reasoning powers could be trained (Romberg, 1989). It is a subject that develops and trains an individual's fundamental mental dispositions and actions, and a subject that displays sharpness of the mind. Another major reason is its use in other disciplines and is seen as a subject that serves to develop 'basic academic competencies'. Mathematics has played fundamental role in the economic development of society. The great achievements of technology in all its forms, which influence life of every human being, have led to widespread importance of mathematics since use of mathematics forms the basis for these achievements. The usefulness of mathematics in job opportunities and in the future lives of students as citizens has further strengthened its position in schools. In this role, it is viewed as being of major importance, though not necessarily for its own sake. In the last two centuries or so, mathematics has been used as a 'screening device' for entry to numerous professions. In future also, the fastest-growing occupations will require employees who have much higher mathematical capabilities than do the current job requirements. All these arguments lead to the general view that mathematics has achieved central place in school curriculum and will continue to have this privileged position in future all over the world.

Aims of Mathematics Education in Schools

In the previous section, we have seen that, basically, there are three categories of fundamental reasons for the mathematics to occupy central place in school curriculum; viz., the development of reasoning power, technological and socio-economic development of society at large and usefulness in employment and providing students with prerequisites that may help them to cope with life in future. Accordingly, it is of paramount importance to ask fundamental questions about the aims of mathematics education in schools.

Historically, in most countries in the world, only a small elite section of a society who belonged to the ruling or rich classes had *access* to formal education. The number of those who received formal education including mathematics education was very small with the result that the school mathematics curriculum was developed in a specific social and cultural context. Those who framed it had a small minority in mind. The rest of the general public either did not receive any formal education including mathematics or received the rudiments of basics through practice or through learning a trade. It was only late in 18th and early 19th century that education, including mathematics, became available to general public and what was once learned by a few was now made available to all. Since then a growing body of concerned individuals and groups is making efforts to enhance its

values by formulating aims and purposes of such education for all. A committee on the Reorganisation of Mathematics in Secondary Education (1923) in America reports :

> 'A discussion of mathematical education, and of ways and means of enhancing its values, must be approached first of all on the basis of a precise and comprehensive formulation of the valid aims and purposes of such education. Only on such basis can we approach intelligently the problems relating to the selection and organisation of material, the methods of teaching and the point of view, which should govern instruction, and the qualifications and training of the teachers who impart it. Such aims and purposes of the teaching of mathematics, moreover, must be sought in the nature of the subject, the role it plays in practical, intellectual and spiritual life of the world and in the interests and capacities of the students' (The Committee on Reorganization of Mathematics in Secondary Education, 1923 (1970), p.11).

Accordingly, aims of mathematics education should fall into three categories, namely utilitarian, disciplinary and for socio-economic development and cultural maintenance of the society.

Utilitarian aims include practical utility of mathematical concepts in the life of every individual. Now-a-days, with the advent of automation and information technology, there is a need to have mathematically literate work force who have 'belief in the utility and value of mathematics' (Pollak, 1987). Clearly, school mathematics must have a strong 'service element' that equip students with understanding of the fundamental operations and equip them to apply them in new situations, which they will meet out of school. Students no longer require 'shopkeeper' arithmetic skills; rather, paper and pencil computational proficiency which is the major aim of school mathematics. Students need to possess 'knowledge, skills, flexibility and attitude to change, manage and develop jobs in the present and in the future' (Niss, 1996). Thus, utilisation aims of mathematics education must be reflected in instructional material, teaching process and in assessment

Disciplinary aims of mathematics education include the acquisition of concepts in terms of which quantitative thinking in the world is done. It involves development of ability to think and analyse 'complex situations mathematically, recognise and restructure logical relations between interdependent factors and generalisation, mental habits and attitudes including flexibility, perseverance, interest, curiosity, and inventiveness-communicating ideas mathematically, a love for precision, a distaste for vagueness and incompleteness'.

Aims of mathematics education related to the socio-economic development and cultural maintenance of the society include training of more

people in scientific knowledge. It involves development of mathematically literate workforce with a zeal for lifelong learning and an informed electorate. By mathematically literate workforce, we mean individual workers who have ability to handle complex problems with precision, analyse situations with mathematical rigour and communicate mathematically.

Lifelong learning is essential these days, because employment counsellors are claiming that due to the rapid changes in technology and employment pattern, workers will have to frequently change jobs and each job will require re-training in various skills. Thus a flexible workforce capable of lifelong learning is required which implies that school mathematics must 'emphasize a dynamic form of literacy'. Moreover, it is claimed that the most significant growth in new jobs at present and in future will be in fields requiring higher level of education.

An educated informed electorate is extremely important for a democratic country (like our's) in which political and social decisions involve complex technical issues. Citizens must be able to read and interpret complex information. Current issues like environmental protection, defence spending, taxation, debt, etc. involve many interrelated questions. Today's society expects schools to ensure that students not only become informed citizens capable of understanding and analysing issues in statistical terms but acquire skills to solve such problems efficiently in life.

Linking Mathematics with Life Skills

Due to technological revolution, mathematics and mathematical thinking have become critically important for an individual to function effectively in day-to-day private and social life. Accordingly, mathematical competence as a goal of instruction and the way it is acquired through schooling has permeated in every national curriculum framework in the world. By mathematical competence as a goal of instruction means development of individuals who have acquired ability 'to explore, to conjecture, to reason, to communicate mathematically and becoming confident in one's own ability. The curriculum should be permeated with these objectives and experience such that they become commonplace in the lives of students' (NCTM 1989). The traditional method of learning mathematics that promotes acquisition of 'passive and isolated bits of information' and a variety of relations, rules, procedures, etc. has to be shifted to include methods of investigating and notions of context. The National Council of Teachers of Mathematics in the United States in its reform document of mathematics education reports :

> 'Learning mathematics extends beyond Learning Concepts, procedures and their applications. It also includes developing a disposition toward mathematics and seeing mathematics as a powerful way to looking at situations. Disposition refers not simply to attitudes but to a tendency to think and to act in

positive ways. Student's mathematical dispositions are manifested in the way they approach tasks whether with confidence, willingness to explore alternatives, perseverance, and interest and in their tendency to reflect on their own thinking.'

(NCTM 1989, p.233)

This dispositional view of mathematical competence is valid for any student irrespective of caste, creed, sex, race, developed/developing countries all over the world. Thus, one has to gear up teaching/learning activities such that these goals are realised in the schools. Taking into account the above conception of what constitutes a mathematical disposition, meaningful and authentic context should play an important role in mathematics teaching and learning.

In other words, we require that school mathematics should become 'mathematics for life' rather than a collection of 'decontextualised esoteric, abstract and useless knowledge' (Volmink, 1994). To justify this view we make an attempt to link school mathematics with life skills so that students see purpose in learning it and become confident to handle any situation that needs tangible solution. 'Problem solving, decision making, communication, self-awareness, critical thinking, creative thinking, coping with stress, generative thinking' (National Curriculum Framework for School Education, 2000) are some of the core life skills students need to acquire in school.

Problem Solving

Development of each student's ability to become better problem solver is the aim of mathematical education, which is repeatedly expressed in every curriculum framework. Gagne (1970), who classed problem-solving as the highest form of learning; Orton, (1987), defined problem solving as... 'a process by which a learner discovers a combination of previously learned rules...to achieve a solution for a novel problem situation'. For some people problem-solving is the essence of teaching-learning process of mathematics They regard mathematics as merely a 'set of tools available for the active process of problem solving' (Orton, 1987). Voluminous literature is available on problem-solving studies. It is reported that research into human problem-solving has a well-earned reputation for being the most chaotic of all identifiable categories of human learning. All these research studies suggest that problem solving is an important activity of teaching learning process of mathematics so every possible attempt has to be made to impart this (life) skill to students successfully so that they become masters of their own present and future. However, other life skills stated above, in fact, are included in problem solving as far as mathematics education is concerned. Let us consider some examples to illustrate the worldly experiences within the domain of mathematics subject and other academic subjects.

Example 1 : Tell your friend to write any multi-digit number, say 748. Ask him to add up these three digits and then subtract the total from the original. What will be the result?

Next ask him to cross out any one of the three digits and tell you the remaining ones. Then you tell him the digit he has crossed out, although you know neither the original nor what your friend has done with it.

How is this explained?

(Perelman, 1985)

Example 2 : New Year's Day is celebrated in large number of countries all over the world. Tell me which of the two days, Saturday or Sunday, happens to be more frequently a New Year's Day?

Example 3 : We celebrate annual sports day in the school. Several students from nearby schools take part in the sports meet. Tell me, is it possible that among them there are not two students who are acquainted with the same number of students present at the meet.

Example 4 : Suppose that two cars move accordingly to the graph as shown in Fig. 1.1 of velocity versus time. How do you imagine movement of the two cars? Do the initial positions matter? How ? Do they meet? When? Is one of the cars always ahead of the other?

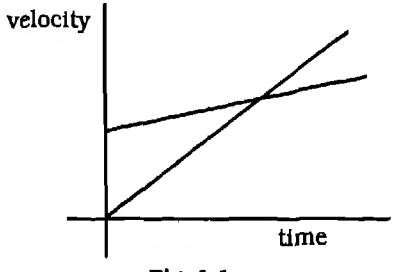

Fig. 1.1

Example 5 : The school has to elect the head boy. Three students Latif, Sanjay and Surinder have been nominated for this post. From a small poll it is estimated that Latif has a probability of .37 of winning and Sanjay has a probability of .44. What can you say about Surinder's probability of winning the election?

However, we may note that problems depicting real world situations itself is not sufficient to make students efficient problem solver. There is a need to use teaching strategy different from the present one such that it enhances the understanding of the suggested problem situation. Teachers will have to 'probe student responses, ask key questions' in order to make them realise use of adequate/inadequate strategies. Research has shown that such questions and tasks can help students to understand or be aware of their own misconceptions and inappropriate strategies used. Present stereotyped form of teaching that relies heavily on 'exposition-examples-exercise' needs to be changed. In the response of above argument we tentatively suggest the following five steps which teacher may use in the classroom situation while conducting problem-solving sessions :

1. Pose a concrete situation from the child's immediate environment either in the descriptive form or in picture form.
2. Allow students to critically examine the given situation and then describe it.

3. Apply an appropriate strategy.
4. Check the given situation in the light of results of step 3.
5. Encourage students to pose a variety of similar such situations.

Two aspects of this model are particularly noteworthy :

Firstly, it emphasises on a concrete situation in order to validate application of abstract mathematical concepts and ends on a concrete situation. Secondly, it emphases on reinforcement principle in the process. To approve/disapprove the suggested teaching steps we need active research basis.

Conclusion

The problem of 'linking mathematics with life skills' has not been given great amount of explicit attention by researchers in mathematics education. There is a need to have active research basis which provides direction to develop problems either in descriptive form or in picture form related with child's immediate environment so that teachers have a rich repertoire of mathematical problem situations from concrete real world. Also, use of concrete real world situations enable students to approach new mathematical concepts using ideas that are familiar to them. In addition to this the students see the purpose of learning mathematics, making it more popular and successful as a school subject. One important characteristics of this topic under investigation is that contextual formulation of problems is culture dependent, that is, a context that might work in one cultural setting may not be successful in another one even if the underlying mathematical concepts are same. So, we should have a clear picture of the underlying cultural setting of the community we are dealing with and also an abundance of real examples of using and applying mathematics.

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Curriculum for Mathematics Education

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Abstract

This paper discusses some of the main reasons due to which the majority of Indian population does not come under the umbrella of education and also suggests the way towards universalisation of primary education. It further attempts to develop a Mathematics curriculum based on the requirements of the society. It also makes certain recommendations for the minimum school education programme; and at the same time, there are also some recommendations for the deletion of certain topics to ensure that Mathematics education does not contribute to the dropout rate. Towards the end, it offers some suggestions to the curriculum designers, such as cultivation of native skills, and harnessing them for further educational developments, inculcation of mental arithmetic, development of computation skills and achieving mastery level. The author thanks Dr. N.B. Bardrinarayan and Sri B.C. Basti for their suggestions, help and guidance in preparation of this article. Thanks are also due to all those people who directly or indirectly contributed to this endeavour.

From time immemorial our prayers used to start from *shloka* from the Brihadaranyaka Upanishad (1 3.28) *"Asatoma sadgamaya, thamasoma jothirgamaya, mrithyorma amrithangamaya"* which means — "From Falsehood to Truth, From Darkness to Light, From Death to Immortality..." The knowledge has to bring us from Falsehood to Truth, and

this requires the real knowledge and proper curriculum.

The Curriculum

Curriculum is the totality of all learning experiences provided to a pupil. The curriculum in its real sense should consist of all the components of learning to be provided by the school, to the children, including the formal programmes of lessons, the syllabus, the co-curricular activities, the climate of the school relationship, the methods of developing the proper attitudes, promoting the culture of peace, the styles of behaviour and values which ensure a healthy society such as respecting the elders in the society, protecting the nature and the total structure of programmes needed for all round development of a child to become a good citizen of the country.

Approach

For the development of such a curriculum in Mathematics education, the focus should be on objectives such as assimilation of mathematical concepts, improving the human intelligence, developing the rational thinking, nurturing the native intelligence, acquisition of technical skills (including computation skills) and the instinct to rise to higher levels of achievements such as creative thinking, application of Mathematics to diverse fields, etc.

Requirements

In order to achieve the above, the requirements of the curriculum are many. Among them, some important ones are :

1. The teachers who are dedicated to the cause of education, who can develop the children to be good citizens of the nation by their own behaviour as well as their teachings.
2. 'The will' among the people and the political system to correct the education system.
3. The proper curriculum to give the required guidance to the teachers.
4. The school buildings, equipments, books, learning materials, etc.
5. Moral, spiritual and the subject training camps to be conducted from time to time for the teachers to refresh and rededicate themselves to the cause of education and to encourage them to update their knowledge.

There are many initial hurdles when we start with any developmental programmes including the educational ones. There are some positive factors too. The curriculum development has to be done with due regards to these problems and taking advantage of the positive factors.

Negative factors can briefly be listed as follows :

1. *Poverty :* Poverty and the need for keeping children at home for work (to look after the younger ones or to graze the cattle, etc.) is one of the main hurdles. Sometimes, the Indian rural skills which are their family trait, are acquired from their parents to their children to earn livelihood

and hence this process is more important to the rural people than sending their children to the schools. Swamy Vivekananda once said "Hungry people cannot be taught..."

2. *Social System :* The caste system has its implications on education also. In some communities education is totally unheard off. In some other communities, children are the first generation learners. The curriculum has to be developed to cater to the needs of all such different classes also.
3. *The Teacher :* The teacher's relationship with the student is considered to be very sacred. When the children are very small, they require attention at that tender age. The teacher should love the pupils and the profession and be able to communicate to the children through different appropriate methods such as story telling or singing or playing, etc. If these are not there with the teacher, the children may not find the school going an interesting experience and sometimes scarring also. A well known personality Dr. Shivarama Karanth told once "Children feel very happy in the evening when they leave the school for home. They should also be made to feel the same happiness in the morning when they come to the school."
4. *Fear of the Teacher :* As a result of severe punishment by some teachers, there is a fear phobia developed among the children towards teachers.
5. *Agriculture :* Agriculture requires the involvement of all the family members in the cultivation process especially during the seeding and harvesting seasons, as extra labour may not be available. Also, the farmers may not be in a position to pay the wages for the extra labour even if it is available. Hence the children may not be permitted to go to the school on many occasions
6. *Geographical Conditions :* In the hilly regions where the population is very scarce, the schools are situated at far off places. In some places the geographical conditions will be so hostile that the small children will not be in a position to go to school by walking long distances, or crossing the rivers, or climbing the hills, or crossing the deserts.
7. *Non-availability of School/Teacher :* Many schools are single teacher schools. The teacher may be absent on many occasions when he has to go to the education office to collect his salary, or to take up census work or to attend to his personal work. In such circumstances, the school has to be kept closed. Sometimes the school is not accessible for the child due to various reasons.

Now we discuss some of the positive factors :

1. *Closeness to Nature :* Most of the children in India are from the villages. The children who live in the villages, hills, forests and far off places, are more close to nature and

this can have a different effect on their education. They are better in computation skills as they do not have calculators or computers as compared to their urban counterparts. They have a better understanding of the environment protection and the reality of life. The ability to observe in these children is also better than that in others. These qualities already present in them should be exploited to make their education more effective.

2. *Traditional Values :* In spite of the invasion of Television, Radio and other modern gadgets, our children continue to keep the traditional values. People in the villages do sing the folk songs, Bhajans and take part in the cultural activities. These activities will also have some good effects on the education of their children also. These qualities could be nourished and utilised in the schools
3. *Developmental Activities :* Several developmental activities like Operation Black Board (O B.B.), PMOST, SOPT etc. are being conducted both by the central and state agencies. A few of them are reaching down to the grass root level and the teachers feel that the government is coming to their help in the enforcement of compulsory education. Awareness programmes or propoganda over mass media like Saksharatha Andolan, Literacy programme, Sarva Shiksha Abhiyan, etc. are commendable here. The need for education to all, particularly the vulnerable sections of the society, the education to the girl child, the uneducated adult, weaker and neglected segments of the society are some of the serious concerns of the nation today.
4. *Parents Care :* Most of the children are under the care of their parents and the parents feel that their children require education. Many parents do not know to read and write. Hence they understand the disadvantages and the difficulties their children will have to face if they are not educated.
5. *Free Education :* In most of the states, the primary education is free in the government schools.
6. *Midday Meals Scheme :* Many states have started the midday meals scheme in different forms for the school children which infact is a boon to the poor people.
7. *Patriotism :* All children by nature are patriotic. If they are taught at the right age, they will take up the fundamental duties of the citizens seriously. Therefore all schools should devote some time in nurturing the talents of the children and in encouraging them to become good citizens of the country. The qualities of hard work and truthfulness can well be developed through the subjects like mathematics.

The Requirements of the Society

In view of the foregoing discussion it may be clear that curriculum for Mathematics in the school level (Class I

to X) will have to be appropriately reorganised to meet the requirements of the society. First of all we consider the expectations of the society from the student who has completed ten years of schooling and suggest the Mathematics topics accordingly. A few of these topics and their prerequisites will be recasted to the previous classes (I to IX) on the basis of the expected minimum mental development of the child.

1. *Calculations :* The ability to perform calculations involving the Mathematical Operations (viz. addition, subtraction, multiplication and division) of whole numbers (without using calculators), and apply with understanding the knowledge, concepts and skills of the operations to larger numbers maintaining sufficient speed. The ability to use the appropriate simple pocket calculators to check the accuracy of the results.
2. *Algebra :* The ability to understand abstract concepts in algebra (like symbolism, literal numbers, variables and constants), for example, the children should learn to generalize the patterns in arithmetic, be able to understand and use symbols in the context of mathematical statements, and to carryout the straight forward manipulations of symbols in simple formulae and equations. Therefore inclusion of number system, polynomials, linear equations and inequations in one variable, GCD, HCF and quadratic equations in algebra may be necessary.
3. *Commercial Mathematics :* There are many students who will not go for the higher studies. They may discontinue and join the business, banking, office work, etc., in which their parents are involved. Hence all the students will require some fundamental knowledge of vocation-oriented mathematics like profit and loss, simple and compound interest, computation of sales tax, commercial tax and income tax, etc. They should be able to perform such calculations about day-to-day money transactions as they are quite useful in everyday life.
4. *Mensuration :* They should be able to solve correctly many real problems in real situations, for example ; to measure area of the walls, to calculate the quantity of bricks required to construct it, to cut the exact quantity of cloth required for a particular dress, to order the exact quantity of timber required for the slope roof of a tiled house, etc. Hence the knowledge of calculations involving the perimeter and area of a triangle, rectangle and area of a circle, the area of a parallelogram and a trapezium, the volume of a cuboid, prism and cylinder, and the surface area of a cuboid and a cylinder are very much essential. This part will be useful to the students who go for civil work supervision, surveying, tailoring and also to those who pursue the education in engineering.
5. *Trigonometry :* The ability to estimate and use a variety of instruments to make measurements

in angles, triangles, proportions, shapes and sizes. These concepts are required for finding the relationship between heights and distances. Therefore, the concepts of Pythagoras Theorem, Sine, Cosine and the Tangent ratios for acute angles, solving problems using these ratios, must be acquired by the students These all concepts should be related to the real life situations.

6. *Geometry :* They should be able to handle, create, discuss, write about three dimensional objects and solve some problems about them physically as well as by calculation and by scale drawing; and interpret the diagrams, plans and maps. Therefore, properties of similar triangles, congruent triangles, properties of circles and the geometric constructions of scale drawings may be made a part of geometry course.
7. *Statistics :* They should be able to read the tabulated information, as in the price lists and time tables, and work out the probable interpretations of unfamiliar informations presented to them. They should also know about diagrams, charts and graphs and be able to interpret those, which are commonly used for communications. They should know enough about simple statistics to be able to interpret them correctly and not to be deceived by them. Therefore Mean, Mode, Median, Price index, Living index, Statistical diagrams, Bar charts, Pie charts, Pictograms, Simple frequency distribution can be made a part of statistics course. The above topics may be related to the population of the country or the educational survey or industrial growth so that the students will know the actual applications of these topics.

The author strongly feels that the above mentioned topics in Mathematics are minimum essential for the ten year school curriculum.

Deletion

The topics on probability, vectors in two dimensions, matrices and transformations need not be included in the 10th class curriculum as these topics are highly discipline oriented and hardly useful to a person pursuing vocation after completion of ten years of schooling. They may be covered at the higher secondary level. Some variations may be done by the Designers, Implementers and Evaluators depending upon local needs.

Prerequisite

At the Primary Stage : The Mathematics curriculum at the primary stage (Classes I to V) should be directed to see that the children after the completion of five years of schooling have the ability to :

— Understand whole numbers and numerals.
— Add, subtract, multiply and divide whole numbers.

— Use and solve simple problems of the daily life relating to money, length, weight, capacity, area and time.
— Use fractions, decimals and percentages.
— Understand the geometrical shapes and distinguish them
— Draw triangle, rectangle, square, circle, etc. by the help of ruler and compass.

At the Upper Primary Stage : At this stage the students are expected to acquire knowledge and understanding of facts, concepts, principles, etc. related to :

— Commercial Mathematics
— Mensuration
— Descriptive Statistics
— Practical Geometry
— Fundamental Algebra.

They should develop proficiency in using tables and ready reckoners, etc. in solving problems. Mathematics upto upper primary stage should be mainly functional.

Secondary Stage : At the Secondary stage the study of Mathematics should undergo the transition from functional Mathematics to the study of Mathematics as a discipline in appropriate form. The shift from the concrete objects to abstraction, symbolism, heuristic and empirical approach to logical thinking, mathematical proof, etc. has to take place slowly at this stage. The logical proofs of the propositions, theorems, etc. are to be introduced at this stage. The pupils should acquire the knowledge and understanding of concepts, symbols and process related to algebra, geometry, elementary trigonometry and statistics. Arithmetic and mensuration should be reintroduced here in the form of applications of logarithms and algebraic equations.

Interrelationship

If pupils are to appreciate and develop a liking for Mathematics, they should be made aware of the interrelationships between Mathematics and other subjects of the curriculum and between Mathematics and the world of experience. They should be able to apply their Mathematics in these areas. Examples of the applications of Mathematics in science, technical studies, geography, economics, industry, commerce and other subjects should be stressed so that the children and their parents will not feel that whatever they have been taught in the school is wasteful.

Suggestions to the Designers, Implementers and Evaluators

A. The approach to the subject at the primary level should be :

1. By concrete situations and pupils experiences.
2. By the method of learning by doing.
3. By providing graded drills, suitable problems, assignments and tests adequately.
4. By reviews and revisions at suitable stages.
5. Through easy problems and common situations.

B. Learning should not be confined to the textbooks alone but suitably enlarged by utilising the variety of the situations that arise from time to time, such as in educational activities connected with craft, garden work, excursions, games, etc.

C. Adequate use of materials such as teaching aids and learning aids should be made

D. Laboratory : The Mathematics classroom in the primary schools should become a laboratory where children count, compute, measure and construct a model These learning experiences should form an integral part of the school work Every child should feel that he/she can make a contribution to the work of the class.

E. Mastery : The teacher should take up the various stages of a topic one by one and make sure that the children have mastered it before passing on to the next.

F. Verification : The pupils should be instructed about the methods of verification, and trained to check the results themselves after working out every problem.

G. Mental Arithmetic : Tests of speed and accuracy should be frequently administered and should be corrected by the teacher in the presence of the child. A few minutes may be devoted every day for mental arithmetic and computation skills

H. Instructional Materials : The instructional materials should conform in every sense of the syllabus. Good quality printed materials like Textbooks, Teachers Hand Books; etc. should be made available to the students and teachers in time. In the west the groups like School Mathematics Study Group (SMSG), School Mathematics Project (SMP), Scottish Mathematics Group have developed some supporting materials. We will have to prepare such materials according to the local needs from time to time.

Evaluation

We will have to address ourselves to the component of evaluation namely the examination system very seriously. It looks from what we see around that exemplifying of education and teaching has been made subordinate to the present examination system and learning in the real sense has taken the back seat. The offshoot of this is private tuitions mushrooming in monstrous proportions. Continuous evaluation system, reducing the class strength, improving the teacher pupil ratio, increasing the classroom tests, etc. are some suggested remedial measures.

A suggestion coming from some quarters that there should not be any examination for the first nine years of schooling may have certain serious implications such as fall in the quality of learning due to callous attitude of the learner on account of non-accountability in the system. This can also be overcome by applying the method of continuous comprehensive evaluation system.

Indian Education System in the Global Context

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Abstract

The educational scene of India is undergoing a continuous change after Independence. This has been possible due to infusion of new ideas and experiments conducted at various levels. Although in numerical terms the country has progressed very well but in terms of quality and relevance it is still lagging behind. It is strongly believed that the path shown by Mahatma Gandhi for a purposeful and relevant education for the people of India is still valid. The position of India in the world in respect of educational development has been discussed in this paper.

INDIA is one of the oldest civilizations of the world with a variety of rich cultural heritage. In fact the Indian education system is as old as the human civilization. As is evident from the Vedic literature, it dates back to about 2500 BC. Thus, Indian Education System predates that of the Greeks by hundreds of years, if not thousands. The Rig-Vedic rituals presuppose a sophisticated knowledge of geometry in the construction of the sacrificial altars and of astronomy in the timing and duration of the sacrificial ritual. *'Sulabhsutras'* are the oldest Indian work on geometry, irrational numbers

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and other mathematical topics which were composed about 600 BC and thus precede Euclid (330-260 BC) and the Greeks by a long stretch of time. *'Sataphatha Brahamana'*, a Vedic text, describes in details the motion of stars, planets and astronomical observation related to the measurement of time which goes beyond the lunar and solar years.

The ancient Indian education system had some of the following important features :

1. It had a very strong vocational component.
2. The general education of the children was meant to develop in them the following skills and qualities :
   (a) to learn the parental crafts/ professions.
   (b) to learn the basic principles of hygiene and general cleanliness.
   (c) the dignity of labour to work with hands and to honour and respect the manual work.
   (d) to develop physical fitness through physical exercises, yoga, etc.
   (e) to learn discipline, truthfulness, respect to elders and women and to help the needy, poors and the younger ones.
   (f) to learn how to live in the society with righteousness and to follow the societal norms faithfully.
   (g) to develop self confidence and self respect in the children.
   (h) to generate in children the love for the nation and to prepare them to make all kinds of sacrifices for the protection of the motherland.

However, Indian education system suffered great setbacks due to several invasions from the western part of the country. Several hundred years of subjugation under foreign rulers and consequent loss to honour, self respect, self confidence, wealth and cottage industries, etc., made the people completely disinterested in education. Due to forced poverty, people were bothered much for their very survival and hence there were no efforts for educational development. Thus, the present educational scenario has most of its roots in the past happenings in our country. Much of the scene, however, has changed in our country after we got independence in 1947. It has achieved multifaceted socio-economic progress during the last 55 years of its independence. The country presents a picture of amazing scientific and technological progress side by side with massive illiteracy. In terms of numbers of institutions, students and teachers, as well as in the variety of educational activity, the Indian education system is the second largest in the world after China. However, inspite of many efforts made, the system of education remains by and large divorced from the overall objectives of the country's development, especially in rural India.

Land and People

The country has an area of 3,287,263 sq.km. extending from the snow-covered Himalayas to the tropical rain forests of the South. It is the seventh

largest country in the world in size. Its population, as on March 1, 2001, stood at 1027.01 million (531.28 million males and 495.73 million females). The second largest populous country in the world, it is the home of 16.7% of the world population. The country, however, accounts for only 2 4% of the total world area

The population of India is more than the population of the entire Europe which consists of 46 countries. It is also greater than the population of entire Africa continent which consists of 53 countries. Thus, in terms of the human resources India has a unique place in the world. This is the world's largest democracy. However, the country is not able to occupy its rightful place in the world body like UNO, nor it is able to play a significant role commensurate to its position. The reasons for this embarrassment are not difficult to find. The country needs a very strong economy and all its people are to be literate, if it really wants to be a strong nation.

Educational Development in Free India

India was a part of the British empire for about 150 years, until gaining independence in 1947. The British systematically destroyed the indigenous system of education and introduced the teaching of European learning through the medium of English. The British-Indian system educated a select few, leaving a wide chasm between the educated and the unlettered. At the time of Independence, 14% of the population was literate and only one child out of three had been enrolled in a primary school.

During the British Raj, a number of educational pioneers, who were also leaders in the struggle for freedom for example, Shri Aurobindo Ghosh, Rabindranath Tagore and Mahatma Gandhi explored ways of reviving the spirit of Indian culture and of building an educational system suited to Indian conditions. During the first few years after Independence, there was serious debate between those attempting to retain the British-Indian Education system and those advocating an alternative model particularly the one designed by Mahatma Gandhi. The Indian Constitution, promulgated on 26th January 1950, sets out the framework for a federal political system and lists the sectors for which the central and state governments are respectively and concurrently responsible.

Education was in the State List, and although by a constitutional amendment in 1976 it has been placed in the Concurrent List, the responsibility for education rests essentially with the states. The central government's responsibility is mainly for the maintenance and coordination of standards of higher and technical education as well as the school education. The constitution directs the states to provide free and compulsory education for all children upto 14 years of age. It also provides for equal educational opportunity for all and the special protection of religious and linguistic minorities.

Soon after Independence, priority was given to the introduction of Basic Education, as proposed by Gandhiji, the objective of which is to develop the total personality of the child by providing instruction related to manual and productive work. While Gandhian Basic Education provided guideline for the planning of primary education, the search for a suitable system of secondary and higher education led the Government of India to appoint two Commissions in 1948 and 1952 respectively. Although some reforms were introduced as a result of the recommendations made by these commissions, a nationally accepted structure of education of 10+2+3 years had to await the conclusion of the third Education Commission — Kothari Commission (1964-66).

On the basis of the recommendations of the Kothari Commission, the Government of India, after consultations with the State Governments and with the approval of the Parliament, announced the National Policy on Education in 1968. The education policy called for "a transformation of the system of education to relate it more closely to the life of the people, a continuous effort to expand educational opportunity, a sustained and intensive effort to raise the quality of education at all stages, an emphasis on the development of Science and Technology, and the cultivation of moral and social values."

Early in 1985 the Central Government reviewed the educational situation in the country and decided to bring about a new education policy with a view to ensuring that the directives contained in the Constitution regarding free and compulsory primary education are complied with and the educational system becomes attuned to the emerging social, cultural, economic and technological situation.

The New Education Policy and a Programme of Action for its implementation were prepared in consultation with the State Governments and were adopted by the Parliament in 1986. The National Policy on Education (NPE-1986) envisages a national system of education which would take determined steps for the universalisation of primary education and the spread of adult literacy, thereby becoming an instrument for reduction of disparities.

The 1986 policy lays stress on the widening of opportunities for the masses but calls for consolidation of the existing system of higher and technical education. It also emphasizes the need for a much higher investment in education, and calls for the level of funding to be raised to 6% of the national income or even higher. The National Policy on Education (NPE-1986) was reviewed by Acharya Ramamurti Committee in 1990 and was further examined by N. Janardhana Reddy Committee in 1991-92. The revised form of NPE-1986 was prepared and accordingly the Programme of Action was also recasted. The Central Government and the State Governments are now trying to implement this revised policy. On the

eve of the Tenth Plan, the country is supposed to make a real breakthrough in achieving its long cherished educational goals as well as in supporting the drive for higher rate of economic growth.

As is well known, the Governmental efforts, though made seriously, are not able to achieve the desired objectives in the field of education due to various reasons, particularly due to wide socio-economic disparities in the country. Rural areas in general, and the tribal areas in particular, have suffered in terms of resources, personnel and infrastructural facilities. This phenomenon of regional disparities in education and development has acquired a major political dimension on the Indian scene. It is reflected in the regional and the sub-regional movements. As already stated, there has been considerable progress in the field of education in the country during the last 55 years. The 2001 census data reveal that there has been an increase in literacy rate in the country. The literacy rate is 65.38% (75.96% for male and 54.28% for female). Kerala retained its position by being on top with 90.91% literacy rate in the country. Bihar stood at the bottom with a literacy rate of 47.53%, with Rajasthan improving it fast and is having 61.03% literacy rate.

By and large all the States and the Union Territories of the country have adopted 10+2+3 years of the formal education structure. Within this common structure, however, there are wide disparities in facilities and standards. At one extreme are the 'public schools', so called after their British models, and at the other extreme are the ill-equipped, insufficiently staffed and poorly supervised government, rural or Municipal Schools. In between these extremes are a variety of private schools, the well funded 'Central Schools (Kendriya Vidyalayas)' meant mainly for the children of central government/ defence employees, Navodaya Vidyalayas and basic and post basic schools run by people inspired by Gandhiji's ideas on education.

Due to concerted efforts during the last 55 years, the number of schools in the country has increased by more than four times and there has also been more than seven time rise in the number of pupils. Universities also went up by more than ten times. The number of institutions at each level of education with enrolment is given in Table 1.

Central and States' Efforts for Quality Improvement for School Education

As part of implementation of the National Policy on Education (NPE) 1986 and Programme of Action (POA), 1986 and a revised NPE and POA, 1992, both Central Government and State Governments have made serious efforts for the quantitative and qualitative improvement of education at all levels, particularly the elementary education.

The Central and State Governments have over a period of time evolved strategies to check dropout rates and improve levels of achievements in the

Schools. Based on the recommendations of the National Committee of State Education Ministers, a new scheme known as Sarva Shiksha Abhiyan (SSA) has been evolved to persue universal elementary education in a mission mode. The goals of SSA are : that all 6-14 age group children (i) are in the School/EGS Centre/bridge course by 2003; (ii) complete five year primary education by 2007, and (iii) complete eight years of schooling by 2010.

Quality of education under SSA is the main thrust. Necessary financial support is provided by the Central Government. NCERT provides technical support to the states in their efforts for curriculum renewal and teacher training programmes, etc.

In order to implement any innovative scheme for the improvement of education system in the country, finance is the most important issue.

We generally blame lack of financial resources for the failure to implement our educational policies and programmes and the shortcomings in the system. Considering the extremely poor facilities and infrastructure in the system at all stages and in all types, there is much truth in the perception that Indian education system is a classic instance of semi-productive half investments. While one would never build half a bridge, half a road or half a factory or an incomplete house, our schools without rooms and roofs, our colleges without libraries, our technical institutions without modern equipments, our science departments with obsolete laboratories all speak of the gross failure to appropriate the importance of investment in education. There is very little understanding about the price that the society has to pay to create a national system of education. Generally, this price is highly under-estimated. Very often people believe that this price is essentially in terms of financial investment, say 6% of the National Income. It is very essential to educate the people to realise that 'Money' is the least of all the different prices that the society has to pay for creating a good educational system. Money no doubt is needed for educational reform; but money alone, whatever its quantum, can never achieve the goal. The more significant price that the society has to pay for education includes the investment of thought, of dedication, of sustained hard work by teachers, students, educational administrators and others; of courage to make hard and unpleasant decisions and above all, of a willingness to change the society. The lack of self-control, discipline and hard work in the schools produces its counterparts in the society, and these counterparts of lack of order, laziness and unprincipled behaviour and lethargy in society sets the tone for a still lower level of discipline and order in the minds of students. Power and wealth and status, howsoever acquired, are esteemed in society and the students in the schools also look for short cuts.

Despite all this adverse climate, the Indian concept of *Swadharma* and the inherent satisfaction of the teaching

profession had led many teachers to perform in a dedicated and outstanding manner. But their percentage is very small.

Education is one of the few forces working for equality in society and if quality education is available only on the basis of ability to pay, obviously the objectives of equity will not be well served. But there are several ways in which funds can be mobilised from non-governmental sectors without sacrificing the principle of equity. It is necessary to explore these possibilities and widen the base of educational finance. The entire burden of financing educational development in a large country cannot vest only with the State and Central Government. The local bodies, urban and rural, should also be effectively brought into the picture. Their contribution at present is very limited. The local bodies should have a clear target of mobilisation of resources for education and be responsible for some levels of education.

Another most important financial contribution to education could be through the 'User Charges' whether it is from industry which utilizes technical and vocational manpower and therefore have a vested interest in contributing to education and research or whether it is from parents who are interested in good education for their children. There is the clear need to look afresh at the level of fees being levied at different levels. There cannot be a sudden big increase in fees at any stage or level. Whatever the increase, it has necessarily to be gradual. It should also not be forgotton that the incidence of high fees will fall largely on the middle classes who are already hit by inflation.

There are, of course, many other methods of mobilising resources for education. These include levying of special cesses for education, encouraging a climate in which donations and investments could flow into the education sector, providing a due share of loanable funds for educational buildings, equipments and for scholarships. Every educational institution could be encouraged to develop its own development funds, raising needed resources from the community and alumni for this purpose. These proposals could be persued at various levels. But, perhaps, one of the most important contributions could come by raising the internal efficiency of educational investment. In particular, the deployment of teachers in relation to average attendance especially in rural areas requires special attention. In a poor country with limited resources, we cannot think of having the teacher-students ratio as 1:20; as in U.S.A. or U.K. but we should be satisfied with our present average national ratio of 1:38 We should, however, follow suitable teaching methodologies for this purpose so that our educational standards do not fall.

Major Problems and Corrective Measures in Education

One of the major problems in the field of education is the Universalisation of Elementary Education. School Education is a sector of fundamental

important to both the individual and the national development process. The rapid growth of knowledge and the emergence of new means and methods of communication make it essential that the curriculum at all the stages of education is renewed continuously to respond to the future challenges. This has now been done by the NCERT at the school stage and by the UGC for higher educational level.

In order to fulfill its role as a vehicle for social change, the curriculum at the school and higher education level has to be dynamic enough to the changing national priorities and long term development goals of the country

Another serious problem is the uneven development of educational facilities at the school and higher education stage. Table 2 shows the availability of educational facilities population-wise for different States/ UTs of the country. It is obvious from this table that bigger states like U.P., M.P. and Bihar stand much behind the states like Maharashtra and Karnataka in the educational facilities for higher education including technical and medical education. This gap need to be rectified as soon as possible.

Despite many policy statements relating to improvement of higher and technical education, the majority of institutions of this level have not fulfilled their expectations. There has also been a mushroom growth of substandard colleges which are of little academic or socio-economic value.

At present, the higher education system, comprising of general, technical, medical and agricultural streams, is fragmented in terms of structures and policies. Greater cooperation among the streams should be encouraged by promoting networking, sharing of facilities and development of manpower including teachers' training/orientation facilities. There should be greater coherence in policy and planning. To adequately meet these requirements, the National Policy on Education has envisaged the establishment of National Council of Higher Education (NCHE). It is hoped that NCHE will take up the necessary steps to strengthen the coordination for higher education in the country.

During the last 55 years, there has been a large expansion of technical education in the country. Today we have about 552 recognised technical institutions at the first degree level and more than 1128 polytechnics at the diploma level with annual admission capacities of 1.38 lakh and 1.90 lakh students, respectively. About 185 institutions offer facilities for post-graduate studies and research in several specialised areas with an annual capacity of 16,800 students. This quantitative expansion has resulted in the lowering of standards and there exists a structural imbalance of skill requirement of the business sector and the traditional curriculum followed by the educational institutions.

These factors give rise to problems of unemployment and underemployment. The wastage in the system is enormous, being 30% at the degree level, 35% at the diploma level

and 45% at the postgraduate level. The situation in unrecognised institution is still worse. A related phenomenon is the brain-drain involving migration abroad of those trained in emerging areas in excellent institutions.

The linkage and interaction between the technical institutions and the user agencies, such as industries, R&D and design organisations and development sectors is not sufficiently strong. Neither is there a strong interaction among institutions by way of sharing of facilities like equipments, libraries, teaching faculty and other resources.

It is, therefore, essential that suitable steps are taken urgently : (i) to modernize and upgrade the infrastructural facilities, (ii) to strengthen and create the facilities in crucial areas of technology where weaknesses exist, in areas of emerging technologies and in new specialized fields. A more broad-based flexible system with provisions for multiple-point entry should be designed to enable a better response to the unspecified demands of the future. At the micro-level the curriculum should be developed to encourage creativity and innovation in experimental work by introducing problem/process oriented laboratory exercises. New technology oriented entrepreneurship and management courses should be introduced in selected institutions having adequate infrastructural facilities.

Special attention should be given to vocational education. The paramedical vocational courses should get the priority in order to meet the needs of the health manpower in the country. In addition to vocational courses, efforts should be made to offer varied courses of suitable duration to women, rural and tribal students and deprived sections of the society. These courses may be coordinated with the organisations which offer training for self-employment. Non-formal, flexible and need-based vocational programmes should be made available to neo-literates, to the school dropouts, to persons engaged in work and to the unemployed or partially employed persons.

Students who have completed vocational courses should have ample opportunities for career improvement and professional growth. For this purpose, bridge courses which would give them an opportunity to take up higher technical and professional courses should be a necessary component.

Integrating Education with Gandhian Thoughts

Gandhiji was fully aware of the socio-economic and cultural diversity of the people of India. He had widely travelled all parts of the country during the freedom struggle and thus he was quite aware of the utter poverty and social deprivation of large sections of our society living mostly in villages. Gandhiji, therefore, realised the prime importance of manual work for our people. His views on education, therefore, were quite pragmatic and very much relevant to the majority of our

people. Some of the important views of Gandhiji, expressed by him at various occasions are quoted below :

(a) *"In India where more than 80% of the population is agricultural and another 10% industrial, it is a crime to make education merely literary, and unfit boys and girls for manual work. Since a larger part of our time is devoted to labour for earning our bread, hence, our children must from their infancy be taught the dignity of such labour. Our children should not be so taught as to despise labour. There is no reason why a peasant's son after having gone to school should become useless, as he does become, as an agricultural labourer. It is a sad thing that our school boys look upon manual labour with disfavour, if not contempt."*

(b) *"By education I mean an all-round drawing out of the best in child and man—body mind and spirit."*

(c) *Literacy is not the end of education nor even the beginning. It is only one of the means whereby man and woman can be educated. Literacy in itself is no education. I would therefore begin child's education by teaching it the useful handicraft and enabling it to produce from the moment it begins its training. I hold that the highest development of the mind and the soul is possible under such a system of education. Only every handicraft has to be taught not merely mechanically as is done today but scientifically, i.e. child should know the why and the wherefor of every process."*

(d) *"In my scheme of things the hand will handle tools before it draws or traces the writing. The eyes will read the pictures of letters and words as they will know other things in life, the ears will catch the names and meanings of things and sentences. The whole training will be natural, responsive and, therefore, the quickest and the cheapest in the world.*

Manual work will have to be the very centre of the whole thing. The manual training will not consist in producing articles for a school museum or toys which have no value. It should produce marketable articles."

(e) *"I am a firm believer in the principle of free and compulsory primary education for India. I also hold that we shall realise this only by teaching the children a useful vocation and utilizing it as a means for cultivating their mental, physical and spiritual faculties. It will check the progressive decay of our villages and lay the foundation of a just social order in which their is no unnatural division between the 'haves' and the 'have-nots' and everybody is assured of a living wage and the rights to freedom."*

(f) *"I would revolutionalize college education and relate it to national necessities. There would be degrees for mechanical and other engineers. They would be attached to the different industries which should pay for the training of the graduates they need. I have a*

painful experience of some agricultural graduates. Their knowledge is superficial. They lack practical experience."

(g) *"We have to train our people the ways and means through which they themselves can partly or wholly remove their poverty. We have to teach our people that all of us are equal. Nobody becomes superior if he/she is born in a higher caste, or is better educated, or has more wealth. We have to teach our people these fundamentals of religion and ethics. Then we will teach them geography and history. We will begin with the history of their own villages. Now I would teach them the three R's as a means for imparting a knowledge of these things, but we do not need to make them matriculates or graduates for this purpose. A knowledge of English may by a source of income in these days, but it is not necessary to add to the health of one's mind or body. All our energy has been sapped in reading tons of books, which in no way help us to keep ourselves physically and mentally fit or to serve the villages. Though we are politically free, we are hardly free from the subtle domination of the West. There are some people in our country who believe that knowledge can only come from the West. I do not subscribe to this belief. Nor do I subscribe to the belief. Nor do I subscribe to the belief that nothing good can come out of the West."*

Thus, we see that Gandhiji's views on education are very much relevant even today for our country where around 35% people are living below the poverty line and almost the same number is illiterate. Education for these people will be relevant only when they are able to earn their bread through its help.

Indian Educational Scene in Global Context

As is well known 'Education' is the most important human activity. Consequently about 21% of the entire world population is always engaged in this activity. Out of this number about 20% are students and remaining 1% are teachers and other supporting staff.

An important indicator of the developmental stage of a country is its literacy rate. It is seen that the economic development of a country is directly linked with its educational development. Table 3 shows the data for 8 countries of the world out of which 6 countries are the developed ones like USA, UK, Japan, Germany, France and Russia where the Literacy rate is almost 100%. The remaining two countries — China and India are the developing countries having literacy rates during 2001 as 82.8% and 65.38% respectively.

When we see the GNP per capita for the developed and developing countries we clearly observe that the GNP per capita of a country is directly linked with the literacy rate of that country. The literacy rate speaks of the educational development of the country.

It is, therefore, absolutely essential that in order to make India economically strong, educational development has to get the top priority.

While we consider the world scenario in the area of education, as shown in Table 4 we observe that during 2001, the total students population in the world was 1225.81 million which is approximately 20% of the world population. The teacher population in the world during 2001 was approximately 61.0 million, i.e. 1% of the total world population.

When we look for Indian figures for students and the teachers, we find that these figures are lower than the world average. India has approximately 19% students and 0.5% teachers of its total population.

The reasons for this are quite obvious. We have a large dropout rate in our school system, hence we have half the number of teachers as required to maintain the world average. Thus, the dropout rate has to be checked urgently.

It is hoped that with new schemes like SSA coupled up with the mid day meals, etc., India may soon realise 100% literacy rate and then become a strong nation both educationally and economically.

TABLE 1
Growth of Education in Free India

(A) Institutions and Enrolment

Sl.No.	Types of Institution	Number of Institutions		Enrolment Figures (in lakh)	
		1950-51	*1997-98*	*1950-51*	*1997-98*
1	Primary Schools (Classes I-V)	2,09,671	6,10,763	192.0	1087.8
2.	Upper Primary Schools (Classes VI-VIII)	13,596	1,85,506	31.2	394.9
3.	Non-Formal Education Centres	–	2,92,500	–	75.00
4.	Secondary & Higher Secondary Schools (Classes IX-XII)	7,416	1,07,100	15.0	272.4
5.	Teacher Training Schools	782	1,000	0.80	1.60
6.	Teacher Training Colleges	53	550	0.05	1.2
7.	Colleges (Arts, Science, Commerce)	498	7,119	3.6	52.8
8.	Universities (Including Deemed Universities)	27	229	–	6.0

9	Engineering Colleges	58	552	0.0294	1.38
10.	Polytechnics	43	1128	0.034	1.90
11.	Medical Colleges	–	769	–	1.0

(B) Number of Teachers at various Levels

S.No.	*Stages of Education*	*Number of Teachers*	
		1950-51	*1997-98*
1	Primary Level (Classes I-V)	5,37,918	18,71,542
2.	Upper Primary Level (Classes VI-VIII)	85,496	12,11,803
3.	Secondary & Higher Secondary Schools (Classes IX-XII)	1,26,504	15,21,186
4.	University & Colleges	18,648	3,42,000

(C) Students & Teachers Population in India (1997-98) :

(i) Total student population in India 189.6 million

(ii) Total Teaching Community in India 49.47 lakh
For all categories of teachers the sex ratio is the following .
Male Teachers - 70%
Female Teachers - 30%

(D) Outstanding Features of the Indian Education System :

I. It is the second largest and most complex system of the world.

II. Every 6th student is enrolled at the primary level.

III. Every 7th student at the secondary level.

IV. Every 8th student at the higher secondary level in the world as an Indian.

V. Above figures indicate that only about 5.7% of the primary students enter in Universities/Colleges in India.

VI. Out of every 200 persons in the country, one person is a teacher.

VII. The students population is about 19% of the total population of the country.

VIII. Teacher-students ratio (on the average) is 1 : 38.

TABLE 2

Comparative Statement of Existence of Various Levels of Educational Institutions Population-wise in Different States / UTs of India during (1998-99)

Sl. No.	State	% Population of India	Primary Schools	Upper Primary Schools	High Schools / Hr. Sec. Schools	Colleges of General Education	Colleges of Vocational Education	Universities
1.	Andhra Pradesh	7.37	8.27	4 58	9.98	12.32	8.88	8.44
2	Arunachal Pradesh	0 11	0.20	0.17	0.15	0 09	0.046	0 42
3	Assam	2.59	5.30	4.22	4.08	3 54	1.55	2.53
4	Bihar (includes Jharkhand)	10 69	8 57	7.24	4.35	9.90	3.48	7.17
5.	Goa	0.13	0.17	0.05	0.39	0.28	0.47	0 42
6	Gujarat	4.93	2.36	10 54	5 35	4.52	5.12	4.64
7	Haryana	2 05	1.64	0.94	3.37	2.56	2.11	2.11
8	Himachal Pradesh	0.59	1.23	0.63	1 36	0.76	0.28	1.27
9	Jammu & Kashmir	0.98	1 67	1.63	1.20	0 51	0 56	1.27
10.	Karnataka	5.14	3.78	12.70	8.96	11 18	16.25	6 33
11	Kerala	3.10	1 01	1.56	2.77	2 48	1 97	3.80
12.	M P. (includes Chhattisgarh)	7 91	13.86	11.10	7.42	5 51	3.29	7 17
13.	Maharashtra	9.42	6 67	11.67	12 87	11.18	25.27	10.97
14.	Manipur	0 23	0 41	0.33	0.52	0 67	0.14	0.84
15.	Meghalaya	0.22	0.75	0 50	0 44	0.44	0.05	0.42
16	Mizoram	0 09	0.20	0.12	0 20	0.36	0 09	0.00
17.	Nagaland	0.19	0 22	0 25	0.26	0.39	0.05	0.42
18	Orissa	3.57	6 35	6 36	6 06	6.99	2 25	2 11
19	Punjab	2 37	2 02	1.33	2.96	2 58	3.01	2.11
20.	Rajasthan	5 50	5 60	7.79	5 01	3.56	3 60	4.22
21.	Sikkim	0 05	0.08	0.07	0.10	0 03	0.05	0.42
22.	Tamil Nadu	6.05	4 92	2 91	6.54	4.87	8 17	8 86
23	Tripura	0 31	0 33	0.22	0.52	0.21	0 19	0.42
24.	U P. (includes Uttaranchal)	17.0	15 07	10.87	7.42	9 02	2.32	11.81
25.	West Bengal	7.81	8 32	1 51	5.92	5.19	3 10	5.91
26.	Andaman & Nicobar Islands	0.03	0 03	0 03	0.07	0.03	0.05	0.00
27.	Chandigarh	0.09	0.01	0.07	0.10	0.16	0.33	0.84
28	Dadra & Nagar Haveli	0.02	0.02	0.03	0.01	0.00	0.00	0 00
29.	Delhi	1 34	0.43	0.32	1.30	0.85	1.13	4.64
30.	Daman & Diu	0 02	0.01	0 01	0.02	0 01	0 05	0.00
31	Lakshadweep	0 01	0.003	0.002	0.012	0 00	0.00	0.00
32	Pondicherry	0.09	0.06	0 06	0.16	0 11	0 33	0.42

TABLE 3

Population, Literary Rate & GNP Per Capita for Some of the Important Countries of the World for 2001

Sl. No	*Name of the Country*	*Population (2001)*	*GNP Per Capita (2001) (in US dollars)*	*Literacy Rate*
1.	U.S A	25 59 crores	31,910	100%
2.	Japan	12.73 crores	25,170	100%
3.	U.K.	5.95 crores	22,220	100%
4.	Russia	14.47 crores	6,990	100%
5	France	5.95 crores	23,020	100%
6.	Germany	8.2 crores	23,510	100%
7.	China	128.5 crores	3,550	82.8%
8.	India	102.51 crores	2,230	65.38%

TABLE 4

World View of Education

I. Population Scene of India & the World :

		1995	2001
(i)	World :	568.72 crores	613.41 crores
(ii)	India :	92.9 crores	102 51 crores

II. Students and Teachers Population in the World and its Growth Rate :

S. No.	*Stages of Education*	*Year 1980 (In million)*	*Year 1990 (In million)*	*Year 1997 (In million)*
(i)	No. of students at the first stage (Primary level)	556 9	610	668.45
(ii)	No. of students at the second stage (Sec. & Sr. Sec. level)	250.0	299.8	398.12
(iii)	No. of students at the third stage (Higher level)	45.7	63.9	88.16
Total students population at all Levels		**852.6**	**973.7**	**1154.73**

Average yearly growth rate of students population = 17.77 million

Approximate students population in the world during 2001 = 1225.81 million

This is approximately 20% of the world's total population

The teachers population in world during 2001 = 61.0 million

This is approximately 1% of the total World's population.
Average yearly expenditure in the world on Education ***= 5.1% of GNP.***

Average students Population in India during 1997-98 was 181.75 million.
(This is about 19% of India's Population)

The teachers population in India during 1997-98 was ***= 49.47 lakh***

This is approx. 0.5% of the total population of India.

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CONSTITUTION OF INDIA

Part IV A

Fundamental Duties of Citizens

ARTICLE 51A

Fundamental Duties – It shall be the duty of every citizen of India —

(a) to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;

(b) to cherish and follow the noble ideals which inspired our national struggle for freedom;

(c) to uphold and protect the sovereignty, unity and integrity of India;

(d) to defend the country and render national service when called upon to do so;

(e) To promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women,

(f) to value and preserve the rich heritage of our composite culture;

(g) to protect and improve the natural environment including forests, lakes, rivers, wild life and to have compassion for living creatures;

(h) to develop the scientific temper, humanism and the spirit of inquiry and reform;

(i) to safeguard public property and to abjure violence,

(j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement

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